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Sustainability in the Worcester Arts Workshop

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Sustainability in the Worcester Arts Workshop

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Abstract

The Worcester Arts Workshop has served the community since 1974, but like other arts organizations struggles to maintain funding and support. The goal of this project was to assess how to Workshop could improve its social, economic, and environmental sustainability, especially by enhancing revenues and reducing expenditures. We solicited a wide range of stakeholder perspectives, assessed the current use of the building, and conducted an energy audit. We recommend several short term improvements, such as changing light bulbs, insulating lofts, streamlining the website, and increasing marketing and outreach, as well as long term improvements, such as replacing the boiler, increasing class offerings, adding new types of events, extending opening times, and diversifying its audience.

Acknowledgements

Our group would like to graciously extend our thanks to the following people and organizations. The endorsement, encouragement, and backing from them made this amazing project as well as experience possible.

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Executive Summary

Background and Methods:

It is difficult to place a value on the contributions of arts and culture to the UK economy, but there is a consensus that the arts contribute substantially, directly and indirectly, and the Arts Council and others have found that the arts play a key role in revitalizing urban areas and promoting health and well-being, Unfortunately, government funding for the arts has been declining in recent years, and this is especially the case for areas outside London. Many local arts and cultural organizations are facing significant cutbacks.

The Worcester Arts Workshop is an example of an arts organization that has been successfully delivering services to the local community for many years. However, due to the recent funding cuts from the local government, the Workshop is finding it increasingly difficult to continue to operate as they have in the past. Therefore, they are exploring new ways to bring in revenue as well as reduce their current expenditures. Like many other arts organization in the UK, the Workshop has taken a more entrepreneurial approach to this problem by drafting a business and action plan that outlines present and future steps to fulfill their goals. The goal of our project was to explore ways to enhance revenues by maximizing the use of the existing space and to reduce costs by enhancing the environmental sustainability of the facility. We achieved this goal by pursuing four related objectives:

1. We solicited stakeholder perspectives on the Worcester Arts Workshop mission, facilities, and operations;
2. Assessed the temporal and spatial use of facilities;
3. Identified options for improving environmental sustainability; and
4. Provided operational recommendations

We conducted a series of in-depth interviews with primary stakeholders, surveyed Workshop patrons, and members of the public, inventoried the current use of the facilities space, and performed and energy and sustainability audit of the entire premises.

Findings and Conclusions:

From various interviews, meetings, and ad hoc conversations held with stakeholders, we learned information about the Workshop that would have otherwise been overlooked. The main

goals of the Workshop are to make their building the most sustainable building in Worcester and to buy the building from the County Council. For the organization to achieve these goals, more revenue and better organization and management will be key. The stakeholders emphasized that hiring professional managers and reducing turnover will be essential to making the Workshop run more smoothly. Along with this, they also emphasize the need to bring in a larger, more diverse group of participants which would not only increase revenue but also allow the Workshop to have a greater impact on the community.

Our survey of the public confirmed our assumption that relatively few people in the community know about the Workshop, although we were actually surprised by the proportion (20 respondents/100 surveyed or 20%) of people who are 'in the know'. We also conducted a survey of attendees at the event *This Land* and a survey of 1300 people on the Workshop's email list. The surveys revealed that more people would be interested in attending classes on painting, drawing, and yoga, especially if these were offered at more convenient times, such as in the evening and on the weekends. The surveys also revealed that live music and theater shows were the events most people would be interested in attending. With regards to sustainability, both surveys indicated that the patrons believe the Workshop should endeavor to become more sustainable, but their notion of sustainability emphasized long-term, economic sustainability (e.g, through 'community mutualism') rather than the environmental or social aspects of sustainability.

We improved the functionality and usability of the Workshop website by installing a Google Calendar plugin through the main website builder WordPress. This created a real-time calendar that is integrated throughout the website. We also developed a manual explaining to the Workshop staff how to use the Google Calendar, how to attach a new calendar, and how to fix the calendar if any issues arise. These improvements will create an interactive experience, that allows website visitors to scroll over the calendar, and view information about classes offered at different times. The website will also now allow people to view room availability and request rooms to hire directly. These new website functions will also greatly enhance the staff in keeping track of bookings, classes, and events.

We used REVIT® to create an accurate floor plan and a 3D model of the current building. We used the model in our heat loss calculations and energy audit described below, and to assess different seating arrangements in the theater. The Workshop can use the model to

present the seating options to theater companies and others wishing to use the venue, as well as other information such as clearances for moving equipment and sets in and out of the building.

From the utility bills for April 2015 through March 2016, we found that the Workshop uses a total of 56,007 kWh of gas annually, primarily for heating but also for cooking in Café Bliss, at a total annual cost of £2,456.18, or an average of £223.29/month. The Workshop uses a total of 24,156 kWh of electricity primarily for lighting, heating hot water, and firing the kiln, at a total annual cost of £3,744.08, or an average of £312/month.

We compared these to our energy audit findings and found that the kiln is used once a week and consumes about 13% of the electricity in the building. The water heater is well insulated and consumes around 22% of the electricity. From our lighting survey we found that most of the bulbs in the building are not energy efficient and lighting in the building consumes around 20% of the electricity in the building. The remaining 45% of the electricity is used by the café. In addition to our electricity calculations we found that the Workshop uses 4219 kWh of gas per month and the café uses 448 kWh per month. We found that the boiler was outdated and oversized for the building. Its capacity is of 100.7 kW and consumes 90% of the gas used in the building, the remaining 10% is consumed by the stove in the café. From our heat loss calculations we found that the peak heating load, which is used to determine the appropriate size of a boiler for the building, is 52.3 kW.

Recommendations:

Based on our conclusions above, we have developed the following recommendations for the Worcester Arts Workshop. These suggestions are divided into the three pillars of sustainability (social, economic, and environmental), although we recognize there is an enormous overlap among and between these categories. Many of the efforts to promote social and environmental sustainability will also have profound impacts on economic sustainability by enhancing revenues and reducing costs

Recommendations for Promoting Greater Inclusion and Social Sustainability

Marketing and Outreach: We recommend that the Workshop develop a more extensive marketing and outreach effort to attract a broader and more diverse audience (including students

at the University of Worcester) for classes and events, using its website, social media, and other channels.

Events and Classes: We recommend that the Workshop explore further what types of classes and events would be more engaging and attractive to a broader audience (including students). They should trial these **events** and classes and solicit attendee feedback before developing a complete schedule.

Scheduling: We recommend the Workshop develop schedules of classes and events that are more convenient for their patrons, including offerings on evenings, weekend, and holidays.

Lift Access: We recommend that the Workshop explore options for making the facilities more accessible. A possible solution for a lift location would be where the current boiler is if they invest in a combination boiler and place it where the water heater is currently.

Recommendation for Promoting Economic Sustainability

Website: We recommend that the Workshop continue to improve its organization of information and make the website more user friendly through the use of links for easier page navigation. The website should be a primary vehicle for enhancing the Workshop's marketing and outreach efforts.

Facility Assessment and Modeling: We recommend that the Workshop posts floor plans of the basement and theater area on the website as well as post the renders of the different seating arrangements on the website to show the versatility of the room.

Staffing: The workshop should endeavor to recruit and retain more paid, professional staff to ensure the quality and continuity of the administration and the services provided.

Recommendation for Promoting Environmental Sustainability

Short-term: We recommend that the Workshop replaces most of their current light bulbs with LED bulbs, install insulation in the lofts and piping throughout the rooms, weather strip all the windows, draft proof the doors, and invest in wall-mounted electric radiant heaters for the basement. These short-term changes would substantially improve the comfort for staff, volunteers, and patrons and result in modest reductions in energy use

Long-term: We recommend that the Workshop invest in a new combination gas condensing boiler for the facility which would replace the existing boiler and water heater. However, if they

decide to only purchase a boiler there is no need to invest in a new water heater. The energy savings from installing new windows does not justify the costs of replacements at this time, but whenever windows are replaced due to rot, functional failures, or other reasons, they should be replaced with energy efficient alternatives. If the Workshop were to buy the building, they would be able to look into larger investments such as solar panels and remodeling. These more expansive long-term fixes are expensive, and additional outside funding and grants will needed.

Authorship

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1.0 Introduction

Art is an essential component in communities throughout the United Kingdom. It is difficult to place a value on the contributions of arts and culture to the UK economy, but there is a consensus that the arts contribute substantially. For example, Needlands et al (2015, 12) estimate that the arts are responsible directly for 1.7 million job and £77 billion in economic value added annually to the economy. Besides direct impacts on the economy, the Arts Council and others have found that the arts play a key role in revitalizing urban areas and promoting health and well-being. Unfortunately, government funding for the arts has been declining in recent years, and this is especially the case for areas outside London. Many local arts and cultural organizations are facing significant cutbacks.

The Worcester Arts Workshop is an example of an arts organization that has been successfully delivering services to the local community for many years. However, due to the recent funding cuts from the local government the Workshop is finding it increasingly difficult to continue to operate as they have in the past. Therefore, they are exploring new ways to bring in revenue as well as reduce their current expenditures. Like many other arts organizations in the UK, the Workshop has taken a more entrepreneurial approach to this problem by drafting a business and action plan that outlines present and future steps to fulfill their goals. Our project goal is to explore ways to enhance revenues by maximizing the use of the existing space and to reduce costs by enhancing environmental sustainability of the facility.

We assessed the temporal and spatial patterns of room usage in the building. We conducted interviews with sustainability experts and a variety of stakeholders (including volunteers, staff, trustees, and local councilors) to identify the best options to improve sustainability, reduce energy consumption, and enhance space use. We conducted surveys to solicit the opinions of current and prospective patrons of the facilities. Based on our findings we proposed recommendations to the Workshop's draft business plan and overall strategy to enhance future revenues and cut operating costs.

2.0 Background

2.1 History of the Worcester Arts Workshop

In 1974, the Worcester Arts Workshop was formed as a meeting place by a group of visual artists who wanted to share their work. More artists and performers joined the group and they began to offer art workshops to other artists and members of the public in temporary facilities. Less than 10 years down the road, in 1983, the Workshop received its charitable status.

The aim of the Worcester Arts Workshop is to "engage with the local community by providing art opportunities, activities, and development within Worcestershire" (Worcester Arts Workshop, 2015) and "to promote, maintain, improve and advance education amongst the inhabitants of the county" (Charity Commissions, 2015). The overall vision of the Workshop is to become, "the central hub for contemporary creative arts practice, participation and presentation in Worcester" (Worcester Arts Business Plan, 2015, p. 5). Through art courses the community is encouraged to explore creativity, while supporting both local artisans and the Workshop as an institution. Artists can rent out space to sell their work, use for creative endeavors, or use for other charitable activities. The Workshop is home to theater and music performances, and offers various opportunities for residents to volunteer. They also work closely with different organizations such as The Worcester Music Festival, The Worcester Film Festival, SLAP Magazine, the County Council, Shindig, and Worcestershire Arts Partnership (Worcester Arts Workshop, 2015) as well as collaborate with various business such as the Perfect Circle, Red Dress Theatre, and The Everyman Theatre. Through these partnerships the Workshop strives to improve its financial and social standing (Worcester Arts Workshop Business Plan, 2015, p. 17). The Workshop hopes to widen its range of users and increase levels of income in order "to undertake an ongoing programme of repair and refurbishment to the building and work towards a major re-development of the building" (Worcester Arts Business Plan, 2015 p. 5).

The Workshop houses two independent businesses: Café Bliss and the Vamos Theatre Company. Café Bliss is a café located in the gallery space of the Workshop. They serve food with influences from the Caribbean and Mexico and emphasize fresh local produce whenever possible (Café Bliss, n.d.). The Vamos Theatre Company became the resident company in the

Workshop in 2012. They are the leading professional full mask theater company in the UK, touring innovative full mask theater performances both nationally and internationally (Vamos Theatre, n.d.).

According to the business plan of the Worcester Arts Workshop, courses include a variety of topics, such as ceramics, figure drawing, and textile development. Currently, the Workshop offers 22 arts classes for children and adults on a regular basis, as well as periodic exhibits and programs, but there are no regular music, dance, or drama classes. As a result, most of the spaces are only utilized around 5 times per week. According to the business plan, the Workshop is trying to develop more classes, exhibits, programs, and events to increase revenues. Big events such as a launch performance of a new album by a local band or music weekends with several individual performances are some of the types of larger events the Workshop would like to host more in the future. Based on the success of last year's event, the Worcester Film Festival is interested in continuing to hold their event at the Workshop (Worcester Arts Business Plan, 2015 p. 13-14).

The Worcester Arts Workshop has the potential to become the center of attraction in the city. It is a welcoming organization that offers many different activities for all age groups and hosts a variety of events. Other cities have similar arts organizations that contribute to their communities in intrinsic and extrinsic ways.

2.2 Funding Trends for Nonprofit Organizations

Nonprofit organizations receive funding from various sources. According to an Arts Development survey, arts services in England and Wales receive an estimated £200 million yearly in funding. Independent art organizations are primarily supported by local authorities which "account[ed] for up to 10% of the total arts spending in 2014/15." (Arts Development: UK, 2015, para.6). Other major funders for art nonprofits are groups such as the Department of Culture Media and Sport (DCMS), Arts Council England (ACE), and The National Lottery (Stark, Gordon, & Powell, 2013, p 8). There are currently 12 organizations that distribute the National Lottery funding, which includes ACE, the Big Lottery Fund, and Heritage Lottery Fund. The distributors base their decisions on the organization's ability to succeed and their cause (Your National Lottery, n.d.).

Arts organizations also rely on private investments for funding and resources. Just as distributors decide to fund organizations, similar criteria are important to private investment. Those investing from the private sector look for organizations that are effective, cost-efficient, and transparent because these organizations are more trustworthy and will have a tangible impact (Ledbury Research, 2009). Donations from the private sector have become more significant within the art communities as 15% of their funding is from private investment, making it the third highest source of income for the communities as seen in Figure 1. In 2007/08 individual giving hit a record high of £382 million which accounted for more than half of all private investments in arts organizations. The amount given in 2007/08 was £236 million higher than in 1999/2000 (Mermiri, 2009, p 50). After this record high, the amount of private investments has been declining due to the economic recession. However, the ability of the private sector to recover faster than the public sector continues to put emphasis on the importance of private investments. This has led art communities to become more entrepreneurial, flexible, and creative in order to attract donations from the private sector (Mermiri, 2010, p 12).

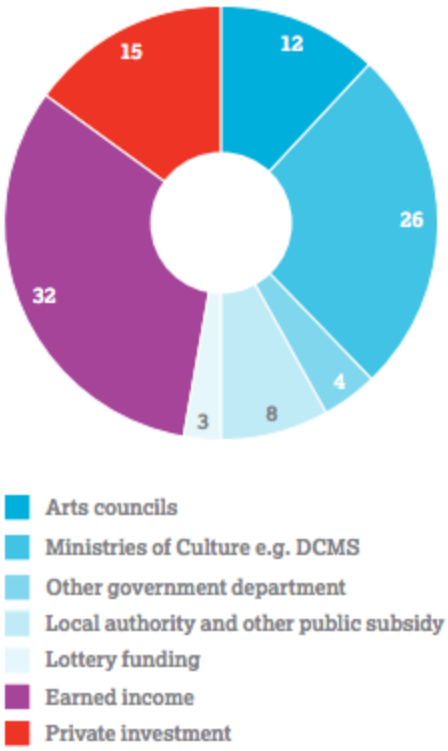


Figure 1: Breakdown of Sources of Income (Mermiri, 2010, p.12)

The funding of nonprofits from both the public and private sectors has become very lopsided and most of the money is allocated to organizations in London. For example, the DCMS in 2012/13 gave an estimated 90% of the £450 million to organizations in London. The combination of this DCMS expenditure with the expenditures of ACE generates a benefit per head of population (php) in London of £68.99 while the expenditure in the rest of England averaged £4.58 php. The bias towards London goes so far that in 2011/12 the capital was awarded 82% of private sector funding for the arts (Stark, Gordon, & Powell, 2013, p. 8&11). With such a small amount being distributed across the rest of England, many small art organizations are facing the challenges of limited resources and funds. Figure 2 shows that while ACE expenditures outside London grew between 1980 and 2012 from £0.66 to £3.55 php, the growth was much smaller than the growth expenditures in London. As a result the net share of ACE spending fell from 19.6% in 1980 to 17.8% in 2012.

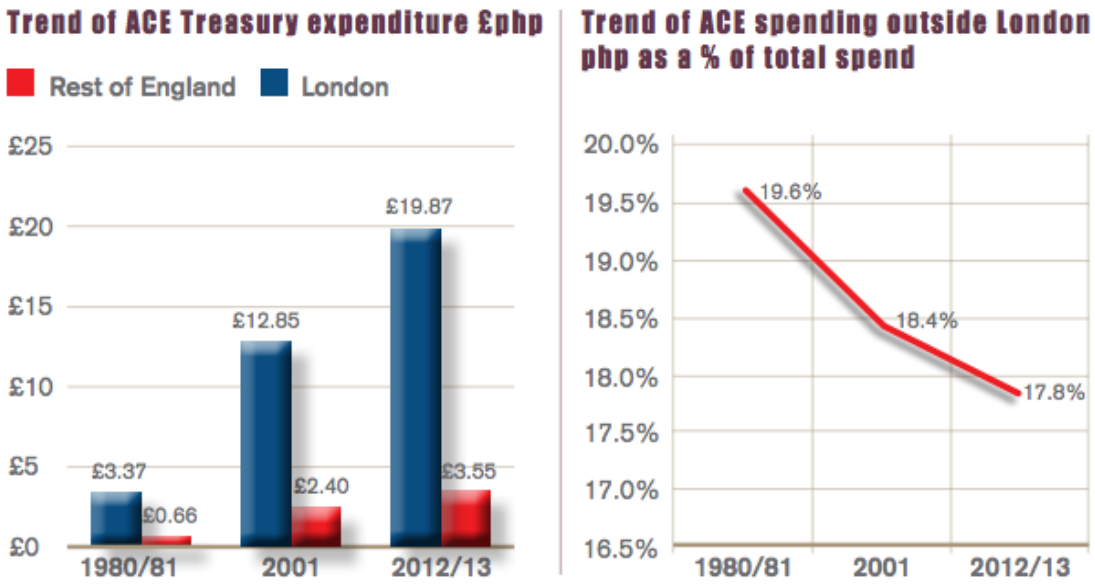


Figure 2: ACE Funding Trends (Stark, Gordon, & Powell, 2013)

Art organizations in the United Kingdom are facing difficulties as they begin to lose government funding especially since the Conservative Party came to power in 2010 (Figure 3). The pressure of funding being cut is at a new high after "Chancellor George Osborne announced that in order to make £20 billion of government savings, unprotected departments- everything

aside from health, schools, defense, and foreign aid- needed to plan for two scenarios: a 25% cut or a 40% cut." (Hutchinson, 2015, para.2). This means that the money set aside for art organizations may decline by either 25% or 40% thus leaving them with the task of finding funds elsewhere. Due to the fact that 53% of the average arts organizations income is provided by public funding, the cut could lead to a decrease of 13%-21% of their overall income (Mermiri, 2010, p 16). Under the Conservative/Liberal coalition funding to the arts decreased significantly and is projected to decline even further under the current Conservative leadership (Figure 3). Figure 3 also shows the effects a 40% cut after 5 years.

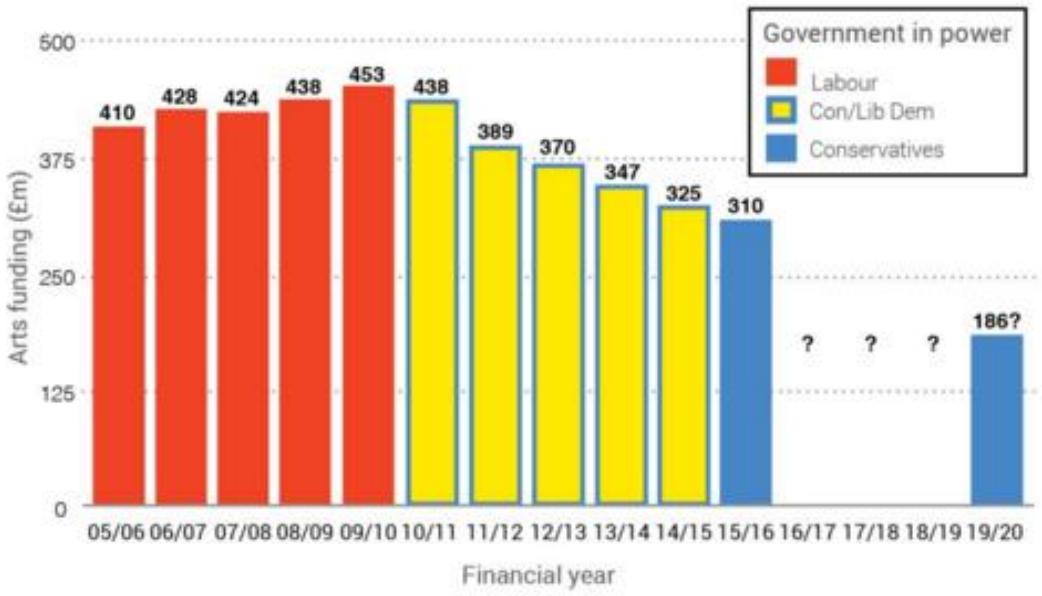


Figure 3: Grant in Aid Arts Funding since 2006 (Mermiri, 2010)

The funding received from the government is already an incredibly small amount and the plan of further cuts has been received both negatively and positively. Most are opposed to the government cuts because they see the arts as beneficial for the community. Those opposed to the cuts such as David Pountney (2015), the chief executive and artistic director of Welsh National Opera, argues that the cutting of the arts "is bad for business and bad for society" (para. 6). He expresses concern that the "eco-system" of cultural life will be destroyed and the "damage to the fabric of cultural provision is especially dangerous as we may not even be aware of the full consequences" (para. 5). Pountney also points out that the cuts will lead to cost increases in art

services such as music lessons which may exclude those from lower-income families from participating (Pountney, 2015).

Although funding cuts are opposed by many, there is a minority in favor. For example, Mark Ravenhill, a playwright-in-residence at the Royal Shakespeare Company, has argued and even wrote a piece for the Telegraph in favor of funding cuts. He suggests that government funding has led to the arts becoming dull to appease the taxpayers and believes that cutting free from the government altogether would allow the arts to become "more truthful, more radical." The cuts are merely a 5% drop from £472 million in 2012/13 to £451 million in 2014/15, which is not as outrageous as those opposing the cuts have claimed (Telegraph View, 2013, para. 1&2).

In receiving funding from outside sources, nonprofits are often hit hardest in times of economic turmoil because private investors are less willing and able to contribute (Sontag-Padilla, Staplefoote, & Gonzalez Morganti, 2012, p. 8 & 13). In comparison to 2014, external partnerships have declined by 27%. This is particularly hard on smaller local governments who provide financial resources to the arts because they are often the first to lose funding. The decrease in partnerships has created a more competitive environment amongst nonprofits. Thus they have turned to organizational sustainability in strategic and operational levels of management (Weerawardena, McDonald, & Mort, 2012, abstract). Another way nonprofits have adjusted to the decline in funding is turning towards a business model and moving away from community focused operations (Evans, Richmond, & Shields, 2005, abstract). For example, 40% of the arts and cultural services that responded to an Arts Development's survey restructured their operations to reduce their vulnerability (Arts Development: UK, 2015, para. 6). They did this by applying principles from for-profit businesses to increase revenue while still holding true to the core mission of the nonprofit (Peredo & McLean, 2006, p 57).

The arts community is far from reaching a plateau. An all-time high of £382 million in individual donations was given to the arts communities in 2008, which happened to be a growth of 25% above inflation. The recession occurred in the following years, but even with that England's regions still had a 4% increase in individual donations. These numbers show that people in the community are willing to put the time and effort in to help the arts stay alive in the economy. You can see the progression of the individual donations in Figure 4 below (Mermiri, 2010).

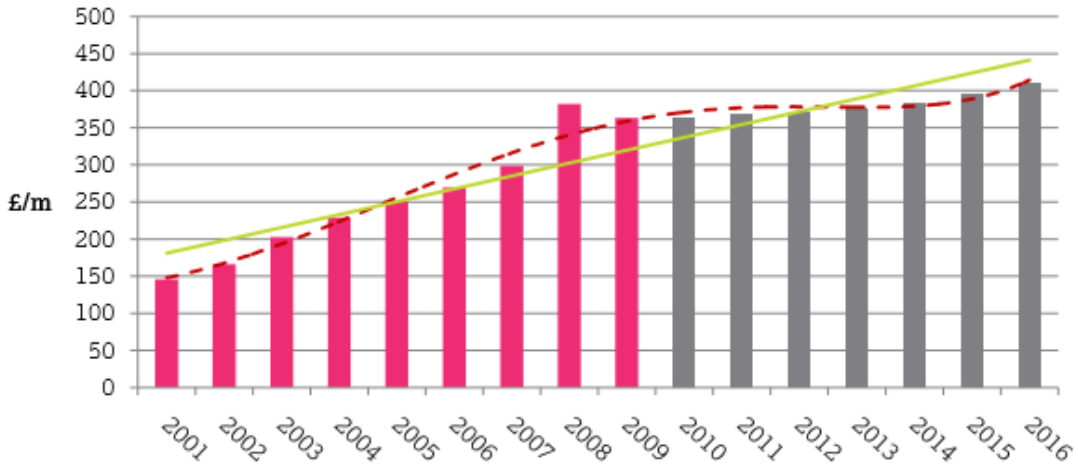


Figure 4: Growth of Individual Giving over Time (Mermiri, 2010)

It has also shown that more people "attend the arts than give philanthropically to the entire voluntary sector." However, the support of their surrounding communities is not enough unfortunately as it only accounts for, on average, 8% of the arts total income. Due to this, "73% of arts organizations increased their fundraising activities in the past 6 months and 48% increased their marketing and online drive" (Mermiri, T., 2010, p. 5). Without the continued support and funding from the government, arts organizations are not going to be able to sustain themselves and the economy is going to take a hit.

The Worcester Arts Workshop is an example of a nonprofit arts organization whose funding from the government has been cut. They are losing the £30,000 grant aid that they had previously received from The City Council in order to cover their rent. The Workshop is a small organization with limited external partnerships that is looking to expand their funding sources to places such as national trusts, lotteries, and government programs (Worcester Arts Workshop Business Plan, 2015, p 29). In order to ensure success and to appeal to potential outside funding, the Workshop drafted a business plan to help them become more entrepreneurial thus becoming more attractive to both the public and private sectors. Just like other arts organizations, the Workshop is turning towards sustainability and energy savings in order to reduce costs.

2.3 Contribution of the Arts to Society

The arts have been shown to have a broad range of positive impacts. Some of the most relevant impacts include urban regeneration, substantial contributions to local, regional, and national economies, and even positive health outcomes. According to Arts Council England, “In terms of culture, the UK is perceived to be the fourth best nation out of 50.”

Arts and cultural organizations and activities contribute substantively to the national and local economy. Based on an assessment of multiple case studies across the UK, the Local Government Association (LGA) identified five main ways the arts impact the economy (Arts Council England, n.d., p. 19):

- attracting visitors
- creating jobs and developing skills
- attracting and retaining businesses
- revitalizing places; and,
- developing talent

These are important findings because research has proven that throughout the country the arts can positively help not only the economy but the surrounding communities as well. In support of these findings, the British arts sector is a key player in the national economy. The sector employs about 1.7 million people and brings in £77 billion annually which makes up 5% of the economy. The Arts Council estimates that, “for every £1 of salary paid by the arts and culture industry, an additional £2.01 is generated in a wider economy” (Arts Council England, n.d.). In just 2013, the sector grew by 9.9% which was greater than any of the other sectors (Needlands et al., 2015, p.12). These statistics show that without the arts community the unemployment rate could be notably higher and the other sectors in the economy would have to make up for revenue shortfalls.

Tourism is a major contributor to the UK economy. The UK is well-known for its cultural attractions and evidently attracts tourists for their culture and visual pieces. For this reason, tourists plan day trips as well as extended trips generating large amounts of spending. By attracting the tourists, Britain was able to sustain over 100,000 jobs and generate an estimated £4.5 billion, which is one fourth of all the spending by international visitors (Arts Council England, n.d., p. 18). The arts community has continually been looked at as one of the smallest

communities over time but it isn't necessarily true. These statistics show that the arts support one fourth of the spending by international visitors. Brown (2013) estimates that an average of £26,817 is added to the value of any residential property in areas with twice the average level of cultural density (Brown, 2013, para 9).

As tourists cycle through the UK's arts attractions, money is being cycled through the local economies. The revenues generated by tourists allow companies to stay in business and residents to keep their jobs. In 2010, an economic impact study of the Anvil Arts Trust in Basingstoke found that their three arts organizations alone generated £5 million in net economic income for the town annually. An evaluation of the Turner Company discovered that opening the art gallery had alone created 49 full time jobs and supported an additional 81 full time jobs in their city (Arts Council England, n.d., p. 20).

Arts have been proven to directly impact people's lives in a positive manner. In 2011, a survey of nearly 10,000 participants found that over 59% of those who had attended a cultural place or event in the last 12 months were more likely to report good health and 385 of those who participate regularly in cultural activities were more likely to report good health benefits. Additionally, 30% of those that participated in the cultural activities reported that they were satisfied with their lives. They have other findings showing that "Research has evidenced that a higher frequency of engagement with arts and culture is generally associated with a higher level of subjective wellbeing" (Arts Council England, n.d.). The UK, specifically, has a program called "arts in health". This practice currently has over 500 members and primarily focuses to enhance the social capital, community health, and healthcare environment through artworks and performances (Macnaughton, 2005, p. 2-3). Research also indicates that the arts can reduce levels of blood pressure, lower heart rate, and increase hormonal benefits (Staricoff, 2004, p. 14).

2.4 Energy and Sustainability

Efforts to promote the environmental sustainability of the buildings are growing in response to concerns about global warming and resource depletion. "According to the UK Green Building Council, globally, buildings account for around 35 per cent of resources, 40 per cent of energy use, consume 12 per cent of the world's drinkable water and produce nearly 40 per cent

of global carbon emissions" (Buckley, 2015 p. 4). Making buildings more sustainable can dramatically affect our impact on the environment.

Moving toward the reuse and adaptation of buildings, even old buildings, rather than demolition and reconstruction is one of the key concepts of sustainability. While it may seem like demolishing an old, inefficient building and starting from scratch might be the best and cheapest idea, refurbishing old buildings may result in a net reduction in the overall use of materials, pollution, and energy from the manufacturing, transportation, and use of new building materials. The Empty Homes Agency (EHA) has demonstrated the feasibility, cost-effectiveness, and energy gains of such types of renovation (Ireland, 2005). Older buildings such as the Workshop are often much less energy efficient than newer buildings, but can often be relatively easily renovated to achieve substantial energy efficiencies (Power, 2008, para. 24). Refurbishing existing buildings is also becoming more popular as it is often cheaper to adapt old buildings than to demolish and rebuild them (Gregory, 2004). According to a study by the University College London, by examining the use of energy, water, construction materials and waste, and detailing what improvements can be made, radical improvements to the building can be achieved relatively easily (Johnson, 2005). Refurbishment of old buildings is not only more cost-effective than demolition, but it has many other benefits too. Aside from being quicker, creating less disruption, and having a positive effect on the wider neighborhood, it also attracts investors which is one of the goals of the Workshop, since they are looking for capital to buy the building from the Council.

There are many benefits to becoming more environmentally sustainable and many arts organizations have reaped substantial financial benefits. Becoming more environmentally conscious also enhances the organizational reputation amongst staff, artists, audiences, and communities. One example of an organization that has reaped the benefits of becoming more sustainable is the National Theatre through a project aimed to minimize the amount of new construction and focus on renovating what was already there. The National Theatre was built in 1970 yet they managed to keep the new build during renovations to about 5% of the whole structure. Some of the measures they implemented to become more sustainable included installing a ground source heat pump, a combined heat and power (CHP) plant to generate heat from waste exhaust, introducing a new cooling strategy that uses ice storage, and installing roof and wall insulation. They introduced LED lighting in the foyers and around the building and

installed a water extraction plant which provides them with a more sustainable supply of potable water. With the changes noted above, they are aiming to generate an extra £1 million per year and expect a 30% reduction in energy use (Buckley, 2015 p. 16).

Another arts organization which has benefited from becoming more environmentally sustainable is the Nottingham Playhouse. Their project aimed to make the building "more comfortable for our audiences, more efficient to heat and light, and therefore much cheaper to operate, so that all our energy, and all your support, goes into our work, not our bills" (Buckley, 2015 p. 34). Before starting the renovations, they analyzed their current energy consumption rates and targeted specific areas that needed improvement. After completing the renovations, they are expecting a 30% reduction in energy consumption and annual cost savings of £55,000-£58,000. The work was completed in the summer of 2015 so it is too early to determine if these savings in fact will be achieved. However, they have already seen a 35% reduction in gas use and a 19% reduction in electricity (Buckley, 2015 p. 34).

Yet another arts organization that benefited from becoming sustainable is SPACE. They run 18 studio buildings scattered throughout London and provide affordable creative workspaces for over 700 artists. The project aimed to increase the lifespan of its buildings, reduce energy usage and running costs, and improve the working conditions for the artists to ensure the sustainability of practicing the arts in London. Some of the measures they took to improve sustainability and increase the lifespan of their buildings were through insulation, specifically by re-roofing, cladding and double glazing, and insulating external walls. Another measure they took was installing a green roof in one of their buildings. They also installed gas central heating systems in two of their buildings, made their windows draught-proof, and the heating pipes were lagged to reduce heating costs. LED lights on passive infrared sensors (PIRS) were installed in common areas and studio lights were replaced with low energy strip lights. With the refurbishment of their buildings, they have already seen significant reductions in U-values, which are a measure of thermal performance, and they are expecting savings of about £50,000 a year in maintenance costs over the next 20 years.

As seen in these examples, arts organizations can benefit greatly from becoming environmentally sustainable. They have the opportunity to reduce the amount of money they spend on energy, electricity, and gas consumption while helping the environment by using less of these resources. They also make the working and public spaces more comfortable and functional,

and they lend the organizations kudos for promoting sustainability. The Workshop has the opportunity to become sustainable for the future by reviewing what their current energy consumption rates are, performing energy and sustainability audits, and specifically targeting the areas that need to improve. By doing this, the Workshop will become more environmentally friendly and be better able to achieve their financial and sustainability goals.

3.0 Methodology

The goal of this project was to provide recommendations to the Worcester Arts Workshop to enhance revenues, reduce operating costs, and aid fundraising in the future. We achieved this goal by pursuing four related objectives:

1. We solicited stakeholder perspectives on the Worcester Arts Workshop mission, facilities, and operations;
2. Assessed the temporal and spatial use of facilities;
3. Identified options for improving environmental sustainability; and
4. Provided operational recommendations.

We completed these objectives by conducting a series of in-depth interviews with primary stakeholders, taking inventory of the current use of the facilities space, and performing an energy and sustainability audit of the Workshop. After we completed these objectives, we used our findings to recommend changes to daily operations to the Workshop's staff and volunteers.

3.1 Objective 1: Solicit Stakeholder Perspectives

In order to assess the current mission, activities, and programs provided by the Worcester Arts Workshop we conducted interviews with key stakeholders and distributed questionnaire surveys to patrons at the Workshop. The stakeholders we interviewed included volunteers and members of the Worcester Arts Workshop staff and board of trustees, the Worcester City Mayor, and Worcester City Councilors. In the interviews and ad hoc supplementary conversations we addressed the current operations and financial state of the Workshop, as well as innovative ideas to enhance the economic and environmental sustainability of the Workshop. We surveyed 100 members of the public through convenience sampling at several locations in Worcester. This survey was used to determine how well-known the organization is within the community. We emailed a survey questionnaire to a list of more than 1300 past and current patrons of the Workshop to solicit opinions about the organization's programs, events, and operations as well as views on sustainability. We also handed out a paper questionnaire at the Workshop's event, *This Land,* to about 40 event attendees.

3.1.1 Interviews with Stakeholders

We conducted semi-structured interviews with key stakeholders of the Workshop and supplemented these interviews with more informal, ad hoc conversations with staff and volunteers in particular. The staff members provided us with an inside look at how the Workshop operates, what part of sustainability is important to them, and what improvements in programming, events, and operations might benefit the Workshop. The council members provided excellent information on funding such as what alternative sources of support and funding exist in the community as well as their perspectives on the new emphasis on sustainability. The Worcester Arts Workshop board members helped us better understand the current mission, future directions, and possible strategies for moving the Workshop forward.

We conducted the interviews and conversations in person. Prior to interviews, we consulted with our advisor and sponsor to establish well worded open-ended questions. We read our interviewees a preamble, found in Appendix A, to explain our mission and allow them the chance to decide if they do or do not wish to take further part. We sent the interviewees any quotes that we used directly in our report and received their approval. We maintained confidentiality and did not disclose names if permission was not granted. The participants had the ability to refuse to answer any questions or end the interview at any point.

We spoke with the current part-time manager Sarah Cotterill, the new administrator Lauren Trim, and Café Bliss owner Amanda Hickling. In addition to conversations, we spent our first week and many times subsequently at the Workshop observing its daily operations. Throughout our time spent at the Workshop and in the Café we gathered innovative and different ideas to better the function of the Workshop. In addition we discussed how the Workshop might enhance its social, economic, and environmental sustainability.

We sat in as observers for a focus group organized by Tom Garcia on March 22, 2016. The purpose of the focus group was for Tom's research on the behavioral aspects of sustainability. He was focused on studying how the Workshop tutors interact with each other and the building as well as what sustainability meant to them. We were able to observe their answers, and ask follow up questions, but because this was not directly our event, we did not develop a preamble. From this focus group we gathered information on what the volunteers and tutors want to change, and which types of sustainability are most important to them.

We conducted interviews with council members as well as board of trustee members Joy Squires and Matt Jenkins as well as board member Richard Hayhow. Our meeting with Richard took place on March 15, 2016 at the Worcester Arts Workshop. Our interview with Joy Squires took place on April 8, 2016 at Café Bliss. Our interview with Matt Jenkins took place on April 19, 2016 at the Worcester Arts Workshop. We asked the questions that can be found in Appendix B and Appendix C. The goal of these interviews was to gather information pertaining to the political aspects of nonprofits and government funding, as well as information on the art community in Worcester. As Council members, Mrs. Squires and Mr. Jenkins have a solid background and understanding of how the Workshop and City Council interact with each other. The three board members have information on the desired artistic direction and infrastructure of the Workshop.

We interviewed Roger Knight, Roger Knight, and the Mayor of Worcester on April 13, 2016 at the City Hall in the Mayor's Parlour. The questions we asked him can be found in Appendix D. The interview was focused on gathering more information on the Workshop's impact on the community. Another focus was to learn more about nonprofits throughout the city, their funding resources, and how they are successful.

We were observers at a group discussion hosted by the Worcester Arts Workshop on April 16, 2016. The group discussion was organized by Sarah Cotterill and Richard Hayhow. We focused on gathering the opinions of the community so that the Workshop can decide what artistic direction is best for them and those who are passionate about the arts. We first gathered as a big group for introductions and then split into 4 groups of 4 to 6 people each to facilitate discussions. Afterwards, we reconvened to discuss what we talked about in our groups with everyone.

3.1.2 Convenience Sample Survey of Public

We drafted a survey and preamble in order to ask the public about the Workshop. The drafts were reviewed and corrected by our advisor. The preamble was a short introduction explaining our work through the University of Worcester and inquiring if we may ask them a few quick questions, to which they could agree or disagree to answer. The survey can be found in Appendix E. The convenience sample survey did not target a specific demographic nor were any

demographics taken into consideration. We chose our sampling locations where the level of foot traffic was high in order to maximize the likely number of respondents and ensure a broad demographic mix.

In the afternoon of April 23 and April 24, 2016 we walked up and down High Street gathering answers for our convenience survey. We also surveyed on April 26, 2016 on High Street. We collected a total of 100 responses and tallied the answers using paper and pen and later entered the data into Google Forms.

3.1.3 Survey of Patrons

Surveying the Workshop's art and event patrons was another major component of our research. We created two different surveys that were to be distributed to events and class patrons. The first surveys were handed out at the play *This Land* on March 19th at the Workshop and the second surveys were emailed out to 1300 people who had indicated an interest in the Workshop and received regular email notifications. First, we drafted the survey instrument and preamble (Appendix A) that was going to be passed out. The preamble was included to inform the person that they may decide if they want to fill out the survey or not and may stop answering questions at any point. The finalized survey for *This Land* can be found in Appendix F. We asked them to identify by gender and age while names and emails were only used, with consent, for the purpose of receiving emails from the Workshop. Our sponsor and advisor reviewed, corrected, and confirmed our drafts. They were then distributed to 20 of the 40 attendees at the event.

We drafted the second survey instrument, preamble (Appendix A), and email message. The preamble was included for the same reasons as previously mentioned. The finalized email survey can be found in Appendix G. We asked them to identify by gender and age and their names were only used for the raffle. The raffle prize, chosen by the part-time manager and a board of trustee member, was two free event tickets. We revised the draft survey instrument based on feedback from our sponsor, advisor, Volunteer, Penny Perrett, and Café Bliss Manager, Amanda Hickling. Our survey instrument was then developed into an online survey using Google Forms because of its simple distribution process and its straight-forward data entry and analysis. The url and email message were sent to Penny who in turn distributed them to the Worcester Arts Workshop list.

3.2 Objective 2: Assess Temporal and Spatial use of Facilities

At the Workshop we reviewed the organizational calendar and event booking forms and identified the room usages. We found a mismatch between the calendar and the information displayed on the website.

The main problem with booking was found to be the lack of information to the public about open times. Information could be obtained through extensive searching on the website and tracking down class times. But even then, the room hire times were never specified anywhere. To alleviate this problem, we updated the Workshop's website to include both a calendar of events, and a spreadsheet where open space could be seen. We did this using plug-ins for the website's base (WordPress), and connected their Google calendar with all the events. This allows the Workshop to show information on their website much more easily, as well as create an interactive experience through the website.

We evaluated the floor plans that were developed in 2009 and compared them to the actual building and noted possible differences or discrepancies in layout and room sizes. The current floor plans had few details with no measurements of the building or rooms. We consulted with the Workshop's staff and came to the conclusion that using the software REVIT® would be the best approach. Using this software we were able to create a much more accurate floor plan and a 3D model of the current building. Having accurate dimensions within easy access will allow the staff to be able to better inform future clients of the rentable spaces. This will help the administration and council of the Workshop operate the facilities in a more economically sustainable way.

3.3 Objective 3: Identify Options for Improving Environmental Sustainability

Another important component to the project was completing the energy and sustainability audit. There were three main steps to complete this task: (1) we reviewed the Workshop's utility records; (2) we interviewed a local energy and sustainability expert; and (3) we conducted the energy and sustainability audit. From our findings, we made recommendations to improve the Workshop's operating practices.

3.3.1 Review of Utility Records

First we reviewed the Workshop's previous utility records, which were provided to us by the part-time manager. These included information such as their past and current electricity, water, and gas rates, as well as their providers. This was the first time that the utility records were systematically examined, as the Workshop is primarily a volunteer organization with limited staff. We collected the data for 12 consecutive months and organized it into graphs that showed both the electric and gas consumption, as well as the wattage used every month. Through this process we also helped the Workshop set up their online account, giving them an easier way to record and monitor their energy uses and eliminating the need for paper bills and office clutter. We conducted research on local commercial energy providers to ensure the Workshop is getting the lowest rates and best services.

3.3.2 Preliminary Workshop Audit

After collecting the utility bills of the Workshop we drafted an audit checklist to help us identify the areas that we needed to focus on while performing the audit. This checklist was based on worksheets used on previous WPI IQP teams as well as checklists we found from energy experts online. These checklists can be found in Appendices H and I. For the preliminary audit we looked at the main consumers of energy which were the boiler, the water heater and the kiln. For each of these system we drafted a separate checklist, which can be found in Appendices J, K, and L and walked through the building to gather the information that we needed. The audit was conducted to find out what models these systems are, how much electricity/gas they consume, and how many hours a day they are run. After we completed this preliminary walkthrough audit, we calculated how much electricity and gas they use on an average month and compared it to the Workshop's current utility bills. We then researched energy efficient systems that could be used to replace their current systems.

3.3.3 Interview with Energy and Sustainability Expert

Once we performed a preliminary audit of the entire building we had an interview with an energy and sustainability expert named Jim Lott. Jim first came to the Workshop on Tuesday April 5, 2016 at 1:30pm to walk through the building so he could be more informed about the

functions when we talked with him later that day. At this first meeting, we gave him a tour of the Workshop and he pointed out items we should be looking at for the audit such as the boiler, lighting, external walls, loft insulation, etc. He stepped us through specifics of the big appliances like the boiler and water heater.

Later that day we met with Jim again at 7:00pm. At this meeting we had a more in depth conversation and is where we asked him specific questions. The main topics of this interview can be found in Appendix M. We began this conversation with a recap of what he saw at the building earlier in the day. He then walked us through a few heat loss calculations to help us better understand what we are actually calculating and trying to determine. Jim provided us with examples of small things the Workshop could implement into their building to save energy as well as options to research for the larger appliances. Our conversation also touched on how we should perform the audit of Café Bliss and gave us an order of importance when performing both audits.

3.3.4 Energy Calculations

After the conversation with Jim Lott, we created a comprehensive list containing any ideas that could be used to make the Workshop more sustainable. This list contained items such as installing solar panels, replacing windows, and changing all the lights to LEDs. The full list can be seen in Appendix N. The list was then separated into four sections: practical solutions, possibilities down the road, non-practical solutions, and unnecessary for the Workshop. Each section was then completed using data collected from the building walkthrough or from online sources. Data collection is detailed more below.

The first of our practical solutions was lighting. After interviewing Jim we decided to collect a lighting inventory of the building as he mentioned that in this particular case lighting could be a big consumer of energy. We created a spreadsheet, which can be found in Appendix O, that helped us gather the lighting information needed. The spreadsheet was divided by room and we gathered information such as number of lighting fixtures, number of light bulbs in the fixtures, types of light bulbs, wattage of each bulb, and an estimate of how long each bulb is on per day, which we estimated by observing their daily operations over the first five weeks. After we collected all of the information that we needed, we calculated how much electricity is

consumed by lighting in an average month and compared it to the utility bills to see what percentage comes from lighting. We then made a copy of the spreadsheet, theoretically replaced all of the light bulbs with energy efficient LEDs, and recalculated the energy consumption. We took note of what the initial cost would be for the Workshop to replace their light bulbs and calculated the payback period.

Our next analysis consisted of performing heat loss calculations of the building. We used two different methods when calculating these values; the 3D REVIT® model and an online tool that Jim Lott provided. When we created the 3D model, we made sure the building's materials were accurate. For example, the exterior walls are 9 inches thick with no insulation, we measured the windows and room sizes as accurately as possible, and made sure we inserted single or double glazed windows where appropriate. The CAD model needed to be as detailed and realistic as possible so we knew that the calculations the program provided were accurate with the everyday operations of the Workshop. Once the model was finished the software's "heating and cooling load" feature was utilized. The second method for calculating heat loss was with the online tool that Jim provided. This tool was very helpful and it went in depth in terms of inputting the buildings dimensions and location of doors and windows. To use this tool, we first had to give the area code for the building, the year it was built and the type of ventilation it uses. Then we had to input each room in the building, including halls and stairways, and their corresponding dimensions. In each room we had to specify what type of room it was, for example the Café Bliss was categorized as a kitchen, what floor the room was on and its corresponding dimensions. In addition to this, if the room had any external walls we had to specify the dimensions of the wall, the type of insulation in the wall, and any windows or doors including dimensions. If the room was on the ground floor, we had to input the type of floor and its corresponding U-value, which depends on the external walls the floor is in contact with. If the room was on the top floor we had to input the dimensions of the roof and the type of roof, including insulation. After inputting all the necessary information, the program gave us the total power heat loss and the total energy heat loss of the building, as well as a breakdown of the heat loss per room. We compared these heat loss calculations to the values from the REVIT® model to accurately recommend the size of a new boiler the building should have.

3.3.5 Café Bliss Audit

We conducted a separate audit of Café Bliss because they do not currently pay their own utilities bills and there is no separate metering of gas or electricity use. After we gathered all the information needed for the overall energy and gas usage of the Worcester Arts Workshop, we analyzed Café Bliss' portion of the energy and gas consumption. We created a spreadsheet, like the ones that were mentioned above, with sections such as the type of appliances in the kitchen, wattage of each appliance, brand and model, and more that are outlined in Appendix P. We also gathered information on how long each appliance is ran daily by talking with the employees of the café. With this data we calculated how many kilowatt hours each appliance uses monthly on average and then calculated the average kilowatt hours Café Bliss uses monthly. We then compared the café usage to the average energy and gas consumption of the entire building to determine what percentage of the overall kilowatt hours they consume.

3.4 Objective 4: Provide Operational Recommendations

After compiling all of our information from our methods, we presented our recommendations for day to day operations. We arrived with these recommendations by performing cost benefit analyses for each of the main audit sections. We presented them with information on how investing in these long term changes would increase sustainability: environmentally, economically and socially.

4.0 Findings

There are three different branches of sustainability that focus on: social, economic, and environmental impacts. Each of our objectives touched on a different one of these branches. We examined aspects of social and economic sustainability through interviews and surveys designed to elicit opinions from stakeholders, patrons, and members of the public. We focused more closely on the economic sustainability in our assessment of the website, operations, and facility use. Finally, our energy and sustainability audit is firmly lodged in the environmental branch.

4.1 Stakeholders Perspectives

The social sustainability component of our project was completed through interviews and surveys. We conducted interviews with key stakeholders such as members on the board of trustees, County Council members, and staff. We also interviewed people we believed to have knowledge on how non-profits run successfully in Worcester such as the Mayor who alone supports three non-profits every year through fundraising. We conducted two surveys aimed at the public in general and patrons of the Workshop. The survey of the public supported our assumption that the Workshop is not well-known in the community.

4.1.1 Management, Staff, and Trustee Perspectives

In order to better understand the Worcester Arts Workshop we spent the first week at the Workshop, observing it during operating hours and getting familiar with its day-to-day function. In doing this we had many important conversations with key stakeholders. We spoke with people who are important to the daily operations of the Workshop such as Sarah Cotterill (the part-time manager), Lauren Trim (new administrator), and Amanda Hickling (owner of Café Bliss).

We learned from the managing figures that they hope to buy the building from the Council and become the most sustainable building in Worcester, however, they do not currently have the capital to tackle these tasks. In becoming more sustainable, they would like not only to reduce their energy consumption but also save money. With regards to their operations, the Workshop has never had a defined set of operational or management procedures, so how it is run varies greatly depending on whoever is managing at the time. This has led to periodic confusions

and disorder in operations, such as we found with the current email inbox and website. The email messages are not filtered properly and thus have become an unsorted and overwhelming conglomeration that can lead to inefficiency and errors, while the website does not portray the correct classes and times.

We participated in a group forum hosted by University of Worcester student, Tom Garcia which was attended by all of the Workshop's tutors. The forum was focused on sustainability writ large and what it meant to the tutors. Sustainability to those instructing classes primarily meant the ability to continue on in a stable financial state. Due to the financial hardships facing the Workshop currently, the participants emphasized economic sustainability over environmental sustainability. The participants expressed some concern about needed improvements, but these were related to issues such as the uneven floor in the pottery room, rather than ways to enhance environmental sustainability per se.

Our group interviewed City Council member and Worcester Arts Workshop board member, Joy Squires. We gained incredibly helpful insight on the problems the Worcester Arts Workshop is currently facing. First, we will address what she said relating to the political aspect as a City Council member. We learned that the City Council has always been very supportive of the Workshop. The major reason the Council had to cut funding to the Workshop, and is now charging a rent fee, is because in 2009 Council lost 40-50% of the money it was receiving from the central government. This new rent fee is a current obstacle for the Workshop and thus they need more financial support. However, outside funders do not like to grant money to organizations knowing that the money will in turn go directly to paying the local government. Instead, funders like to donate money for specific projects and not just paying bills. It was for these same reasons that the Workshop lost the support of the Worcester City Council and Arts Council England. The two funders prefer to fund projects with tangible outcomes rather than cover operational support.

We learned valuable information from the discussion with Mrs. Squires that was related to her position as a member of the board of trustees for the Worcester Arts Workshop. She explained that the Workshop is a complex organization that needs a consistent, stable, professional management. Unfortunately, as noted above outside funders do not like to give money to support operations, such as hiring administrative staff. Another problem is the lack of a broad volunteer base. In the past, the Workshop reached out more to the community but these

efforts have been hampered in recent years by the absence of a paid manager. With Sarah Cotterill recently on board, Mrs. Squires hopes the Workshop will be able to put more time into expanding their reach in the community. The board members see potential in the Workshop as it is, one of the few venues for these kinds of arts activities in Worcester. Environmental sustainability is also important to the Trustees because it will help to lower their energy consumption and costs and thereby preserve the Workshop for years to come.

The interview with Matt Jenkins was proposed by Joy Squires because of his extensive knowledge of sustainability. Matt Jenkins represents the Green Party as a County Council member and he is also a member on the board of trustees. He believes the goal of the Worcester Arts Workshop to become the most sustainable building in Worcester is very important. The goal is lofty and they cannot become completely green in the immediate future because of lack of capital. However, they are constantly making improvements and thus they aim to make every improvement and adjustment on the building as sustainable as possible. The other ultimate goal that many of the board of trustee members want to pursue is buying the Workshop from the Council. From Mr. Jenkins we learned that the Workshop's presence is not greatly known around Worcester and similar to Joy he believes the Workshop needs to have a bigger outreach effort. In particular, Mr. Jenkins said he "want[s] it to be open to as many people as possible." Our interviews with Mr. Jenkins and Mrs. Squire revealed that the Workshop is strongly backed by passionate, optimistic people who have a clear and common vision.

Our meeting with board member Richard Hayhow was more focused on the artistic direction of the Workshop. It is important to understand what the community wants from the arts organization as well as having a clear and consistent artistic direction. Mr. Hayhow believes many of the problems faced by the Workshop are due to a lack of volunteers to do everything necessary to keep the Workshop running. Even with these limitations, the Workshop's board is continuously trying to improve the programming and are reevaluating their current artistic direction and identity.

This direction reboot was more deeply discussed in an open forum on April 16th. This forum was led by the Workshop volunteers and staff, and the people who attended included users of the Workshop and other stakeholders. In this forum participants discussed the direction the Workshop should take in the future and the steps to get there. At the beginning of the forum everyone was handed three pieces of paper and the following three questions:

- What do you think happens at the Workshop?
- What three words would you use to describe the Workshop?
- How inviting is the Workshop?

The questions revealed that participants were well-versed in the activities of the Workshop and while some praised the Workshop as ‘interesting’ ‘essential’ ‘community’, others described it as ‘dysfunctional’ and the premises as ‘unfit.’ Overall, most participants thought the Workshop ‘inviting’ but several said it was not, and some said it was difficult to find the building. After this first part of the forum, the participants split into groups of 4 to 6 people each. The leader of each group used a set of questions to facilitate discussion. These questions included:

- What have the arts in Worcester been missing that the Worcester Arts Workshop could provide?
- How could we use this building respectively and creatively?
- What art is relative to today’s society and the surrounding area?
- What does the Worcester Arts Workshop need to do to engage the community?
- Who is the Worcester Arts Workshop audience?
- What big challenges does the Worcester Arts Workshop face?

These questions facilitated discussions in smaller groups and some good points came out of each discussion. Some of the key points were that the Workshop needs to become more accessible, offer evening and weekend classes, attract young people, improve advertising, and try new activities once rather than just putting them into place before testing. The attendees agreed they do not necessarily have to bring in more activities but rather improve the quality of the current activities they have. The forum was very useful in helping the Workshop identify the next steps to improve operations and activities as well as ways to reach a wider audience. .

4.1.2 Public Opinions

This survey was completed on High Street over a weekend and during a weekday afternoon. We received 100 answers to our convenience sample survey. Of the 100 people only 20 respondents knew about the Workshop, 7 had visited the Workshop, and 5 knew what the Workshop does.

4.1.3 Patron Perspectives

We conducted two surveys of patrons, including a brief paper survey of attendees at the play, *This Land*, and an online survey of 1300 people on the Workshop's mailing list. The survey used to gather information from those attending the *This Land* show was filled out by 20 of the 40 people present. Out of the 20 respondents, 85% had been to the Workshop previously, but only 1 person was enrolled in classes. Most respondents explained their reasons for not taking classes were due to time constraints or lack of interest in the classes offered. Figure 5 indicates that theater shows (17/20), comedy (16/20), and live music (15/20) events were more desirable than art exhibitions or other kinds of events, although this may reflect the bias inherent in sampling respondents at a theater event.

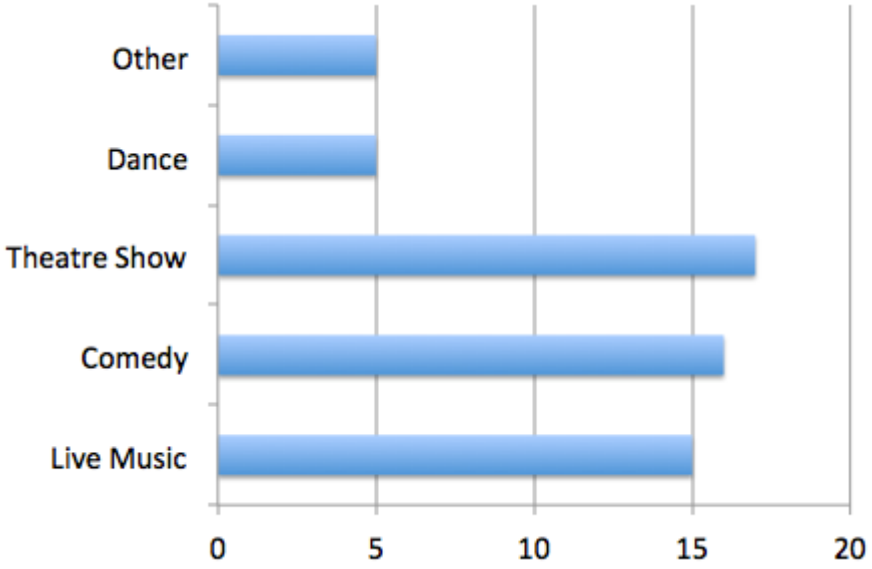


Figure 5: Events patrons are likely to attend (n=20)

The Google form survey that was emailed to approximately 1,300 people was answered by 50 participants. No particular demographic was targeted, however, the respondents were mostly women (70.2%) between the ages 45 and 54 (31.3%). The majority of the answers to the questions have a bias towards those not enrolled in classes as only 5 (10%) of the respondents had taken a class at the Workshop themselves. The respondents were primarily people who

attend events (58%) and those who have children enrolled in classes (14%). The breakdown of the respondents in relation to the Workshop is pictured in Table 1.

Classification of Respondents	Number	Percentage
Event Attendees	29	58%
Class Participants	5	10%
Parents	7	14%
Café Customers	3	6%
Not Available	6	12%

Table 1: Breakdown of Respondents

One of the main goals of our project is to help the Worcester Arts Workshop become more economically sustainable and one way of doing that is increasing participation from current patrons. A major component to this is understanding why the patrons are not currently participating in classes and attending events.

We asked why the respondents do not partake in classes or attend events. Figure 6 and 7 show that although the responses to the open-ended questions varied for each the major reasons given were lack of time and lack of interest in the classes offered or the types of events.

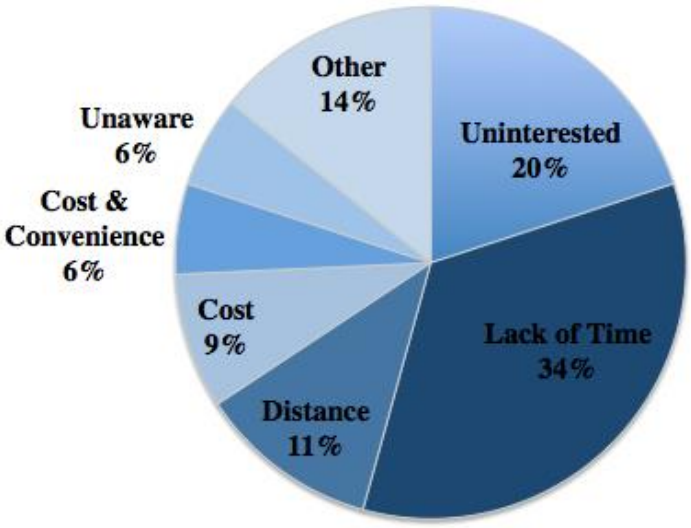


Figure 6: Reasons Patrons are not Enrolled in Classes (n=16)

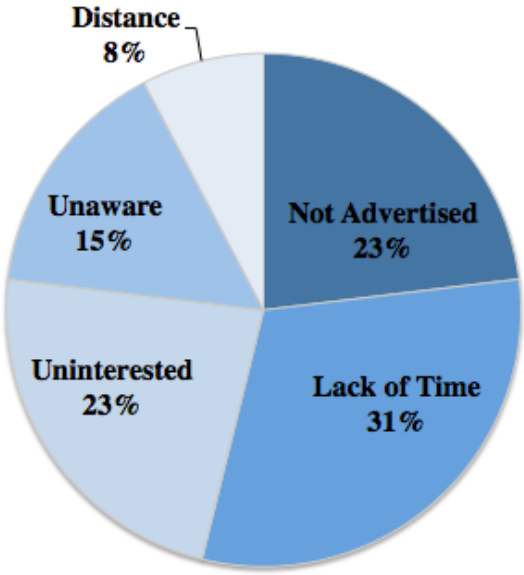


Figure 7: Reasons Patrons are not Attending Events (n=13)

Another important finding is how patrons believe classes and events can be improved. With regards to class improvements, 5/16 respondents suggested the Workshop needs better organization; 3/16 suggested more evening classes; 2/16 suggested other improvements, such as 'cleaner atmosphere' and 'variety of classes' and one respondent suggested 'lower prices'. Regarding improvements for events, only 7/50 people responded. Two respondents suggested 'more parking' and two said the events should be 'less chaotic'.

When asked what classes the respondents would be most interested in, 100% of the 50 respondents answered. Figure 8 below shows that 25/50 (50%) of respondents would be interested in painting classes, 21/50 (42%) in drawing, and 19/50 (38%) in yoga. This is especially interesting because most survey respondents indicated they were not presently enrolled in classes at the Workshop and so they represent a key target audience for outreach.

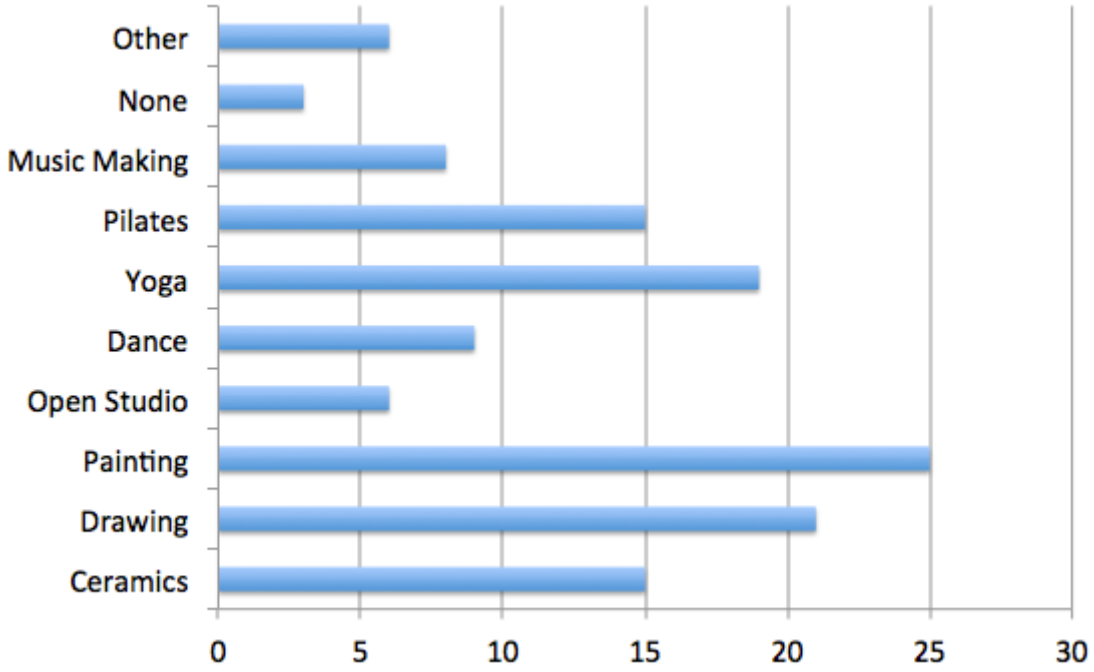


Figure 8: Desired Classes (n=50)

Another important finding from the survey was what events would most interest those in the future. Event patrons have the biggest representation in this survey, thus it is easier to assume that the results of the survey closely resemble that of the population that makes up event patrons. Multiple answers were selected by many of the respondents. Figure 9 below shows which events would draw the largest crowds. In the survey, 47 of the 50 people responded and the 3 that did not were counted under the category labeled ‘none’. A majority of the respondents would be likely to attend live music performances with Lazy Sundays being in a close second.

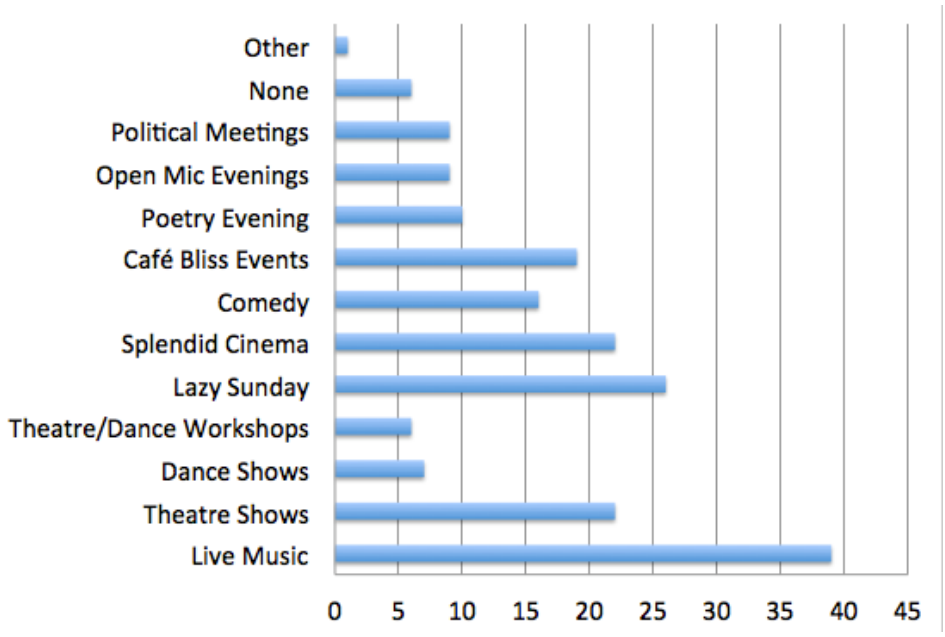


Figure 9: Desired Events (n=47)

When we asked questions geared towards parents of children who are enrolled in classes, 11/50 respondents answered (Figure 10). The favored activity for children was the half term activities which 9/11 (81.8%) chose. The two activities chosen by 8/11 (72.7%) of the respondents were summer holiday activities and painting/drawing workshops.

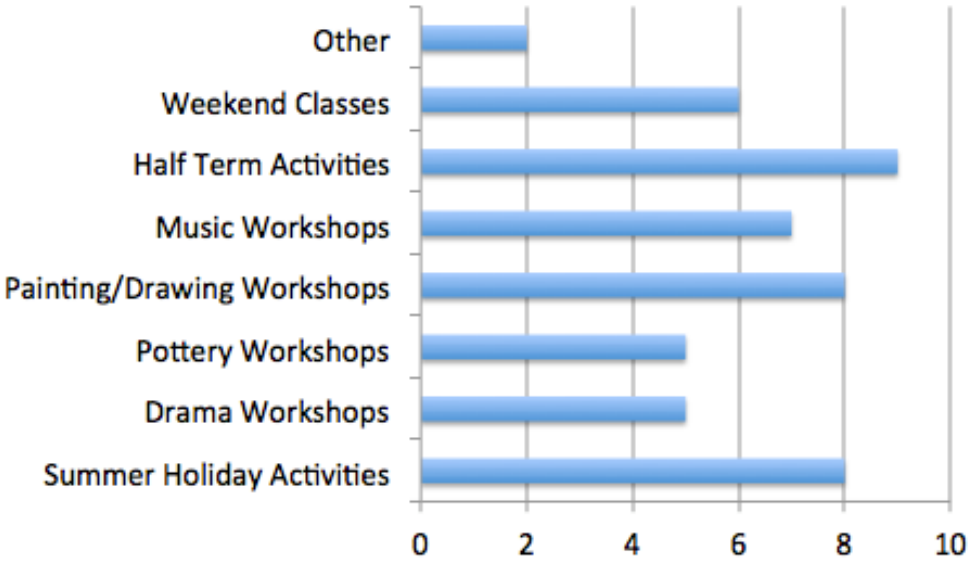


Figure 10: Desired Children's Classes (n=11)

Given the focus of our project on sustainability, we asked respondents what sustainable meant to them and what they believe can be done to make the Workshop more sustainable. Thirty-five of the 50 respondents answered the open-ended question (Figure 11) and the two most popular answers fell under the categories of "Future" (29%) and "Self-sufficiency" (26%). These two answers are relatively similar as many of those who answered under the "Future" category believe sustainability means "to be able to continue", while the "Self-sufficiency" answers focus primarily on the Workshop and its major role in promising a future. The coding used to categorize each answer to the open-ended questions can be seen in Appendix Q.

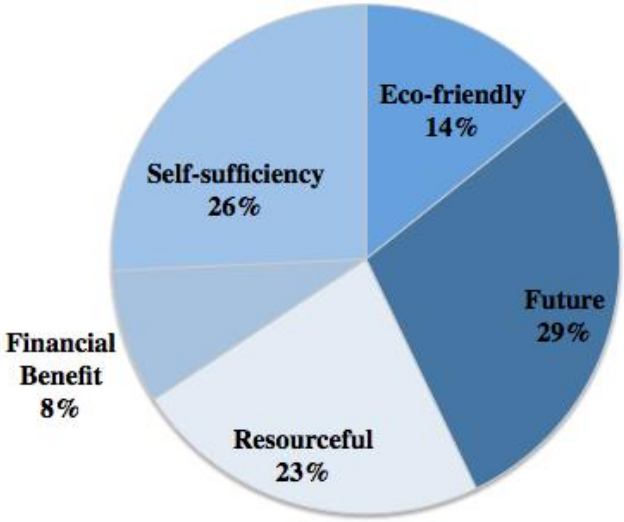


Figure 11: Patron's Definition of Sustainability (n=35)

We also asked respondents what the Workshop could do to improve sustainability (Figure 12). Only 25 people responded to this question and most of them believed "Community Mutualism" would be the most beneficial for the Workshop and its economic sustainability. In their answers respondents emphasized the importance of the Workshop seeking grants and funding, reaching out more to the community, and having a more beneficial impact on Worcester.

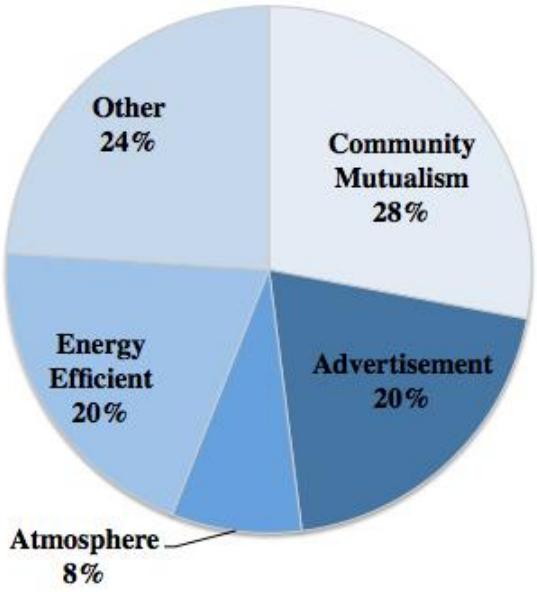


Figure 12: Suggested Sustainability Improvements (n=25)

Lastly, when asked about the importance of sustainability improvements of the Workshop and Café Bliss, the respondents all answered in favor of sustainability. The respondents were asked to rate if they agreed or disagreed with the various statements. Figure 13 shows that 19/41 (46.3%) people strongly agree that the Worcester Arta Workshop should strive to promote environmental sustainability in all of its activities and no one disagreed or strongly disagreed. Figure 14 shows that 33/42 (79%) agree or strongly agree that the Workshop should seek substantial funding in order to become more sustainable. Finally, Figure 15, shows that 33/42 (93%) agree or strongly agree that Café Bliss should continue to promote environmental sustainability by using locally-grown, organic food.

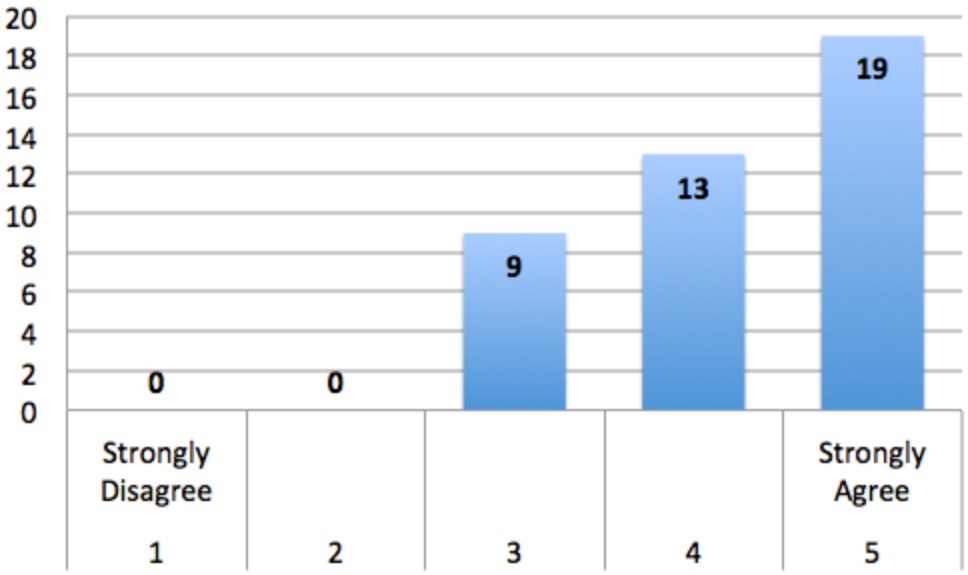


Figure 13: Sustainability in all Activities (n=41)

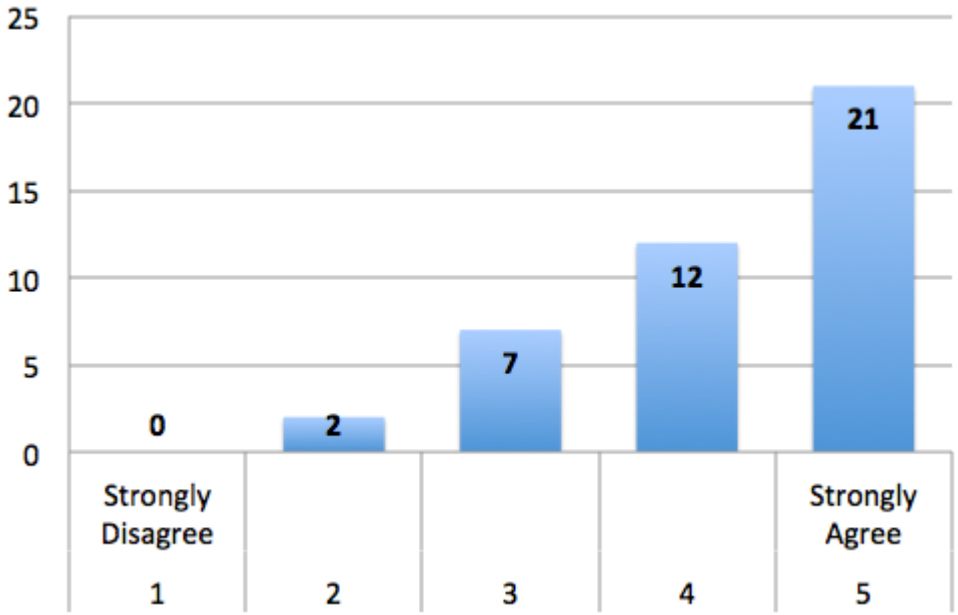


Figure 14: Funding for Sustainability (n=42)

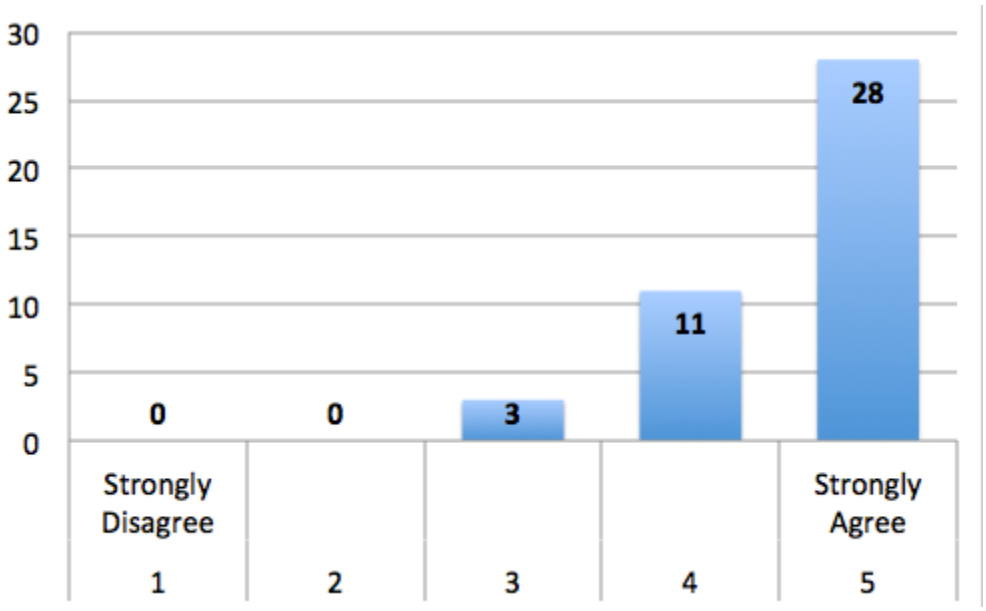


Figure 15: Café Bliss and Sustainability (n=42)

4.2 Website Improvements

The website was updated using a Google Calendar plugin through the main website builder WordPress. This created a real time calendar to be integrated throughout the website to ensure the most accurate information was being presented to the user. Figure 16 shows the website with the calendar addition and Appendix R shows the full website page transition. While only the “events” calendar is shown in the figure, this was also done for the “classes” and “Café Bliss” page.

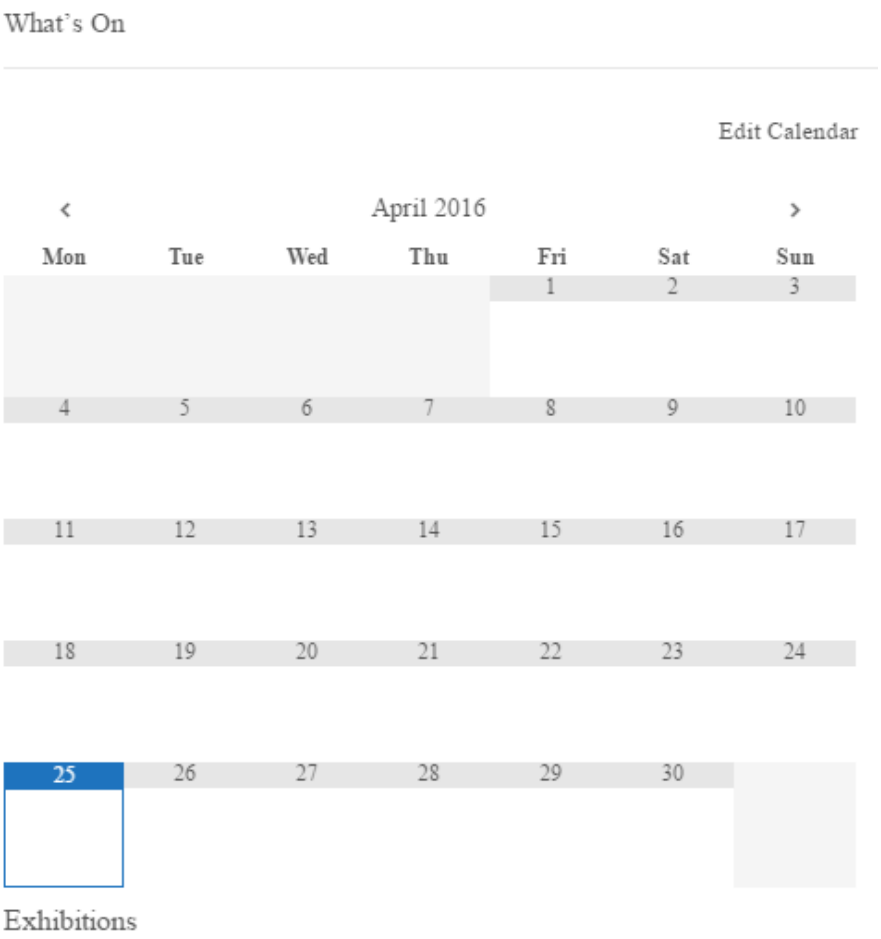


Figure 16: Calendar Addition

After drafting this calendar, the administration was asked how they thought the new website would look. The overall reaction was that this would make converting dates and times from one source to another easier and that having one place to store all the information was more organized. The calendar shown is empty right now, but as the Workshop's administration updates their calendar for future classes, the website will also update in real time. Appendix R1 shows the worksheet given to the Workshop detailing how to use the Google Calendar, how to attach a new calendar, and how to fix the calendar if any issues were to arise. These new updates allow for an interactive experience, where people can scroll over the calendar and have the option of seeing information about the classes offered at that time, or would be able to request a room hire right from the website.

4.3 Facility Assessment and Modeling

As noted in the methods section above, we created a 3D model of the Workshop facility that will have a variety of uses for the Workshop. We used the model in our heat loss calculations that are outlined further below. But the model will also give the Workshop accurate dimensions of their facilities for a variety of purposes. We also used the model to allow the Workshop to assess different seating arrangements in the theatre and present them to theatre companies and others wishing to use the venue.

Having graphic displays and accurate dimensions will allow the Workshop to better inform outside parties that are looking to rent out various spaces. They will also be able to post these dimensions as well as renders of interior rooms on the website for potential renters to be able to see the space. The most important dimensions for the Workshop are those of the theater. The theater is the room that is most rented by outside parties for events and shows. They not only need dimensions of the stage but of the stairs and hallways as well so they can be aware of how much room they have to move equipment in and out of the building. Below is a layout of the theater in the basement (Figure 17) and an overall view of the 3D CAD model (Figure 18). All dimensions are in millimeters.

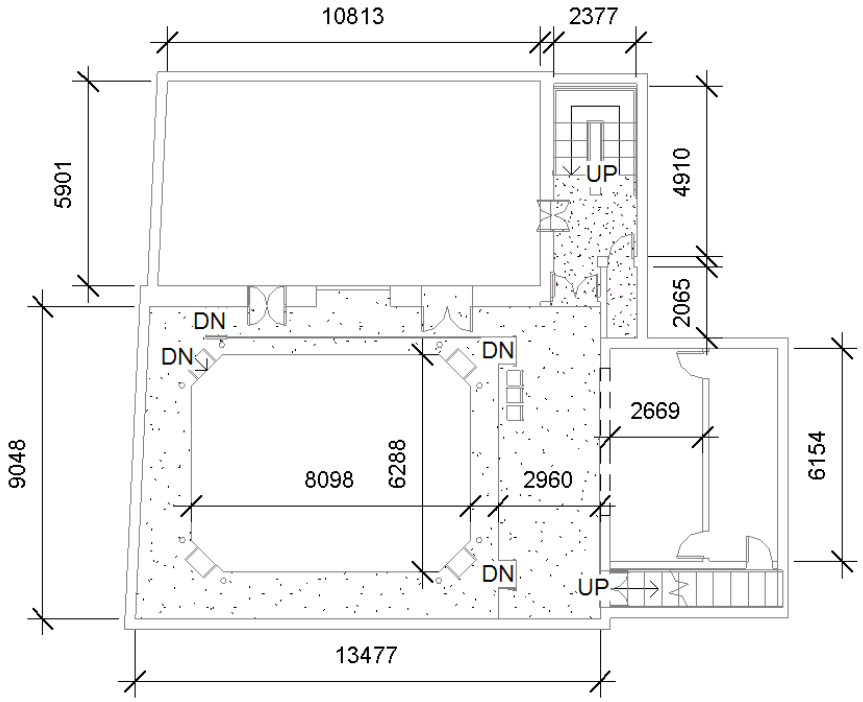


Figure 17: Basement Floor Plan (mm)

Figure 18: 3D Rendering of Workshop with Exposed Theater

The Workshop also asked us to assess different seating arrangement layouts for the theatre in the basement. We met with staff and identified the five most likely seating arrangements for the different kinds of events the Workshop typically hosts. Below you can see the different layouts in Figures 19 – 28.

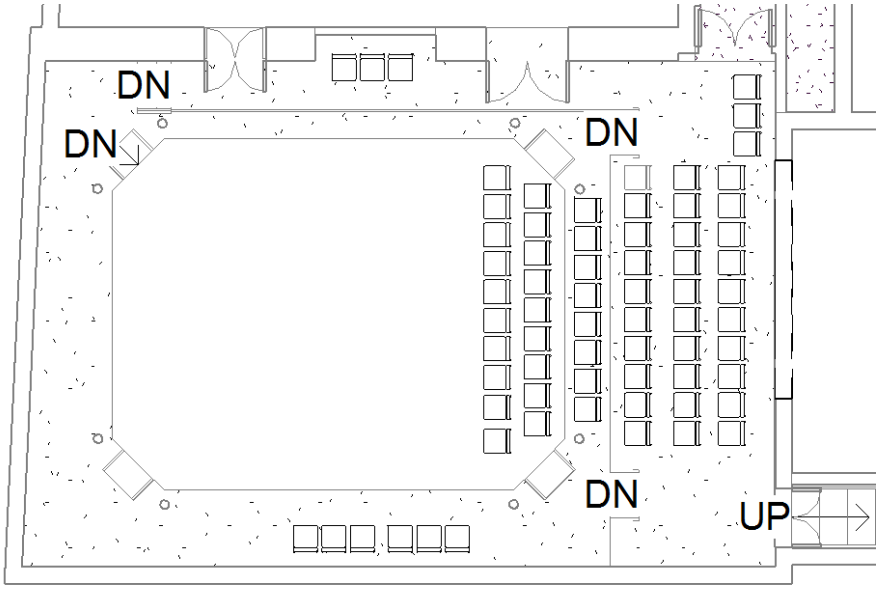


Figure 19: Seating for Theater Performances

Figure 20: Rendering for Theater Performance Seating

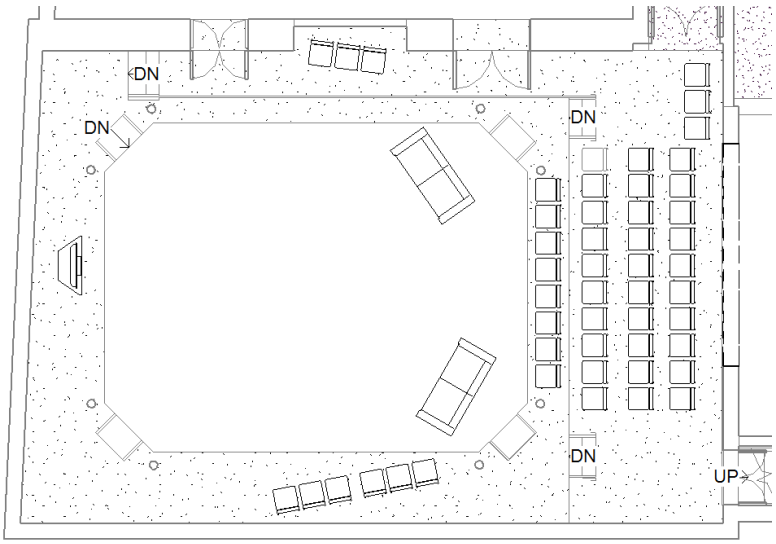


Figure 21: Seating for Cinema Events

Figure 22: Rendering for Cinema Events Seating

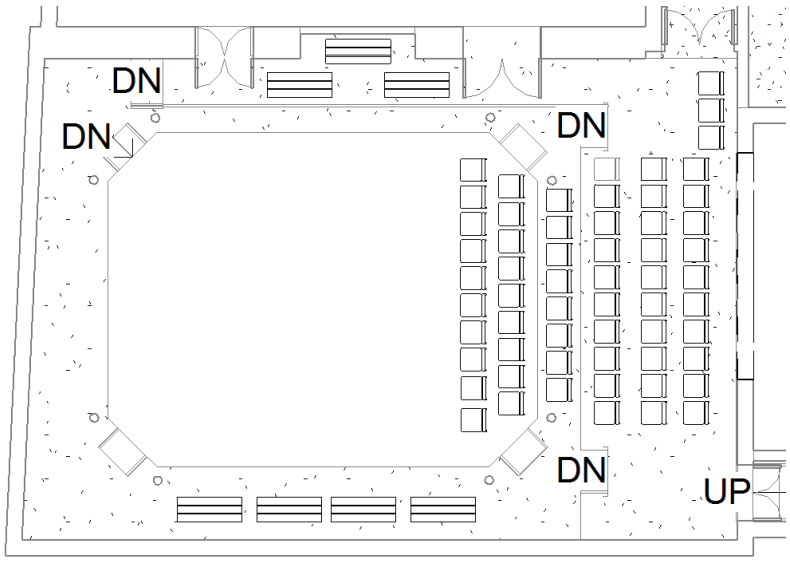


Figure 23: Seating with Chairs and Benches

Figure 24: Rendering for Chairs and Benches Seating

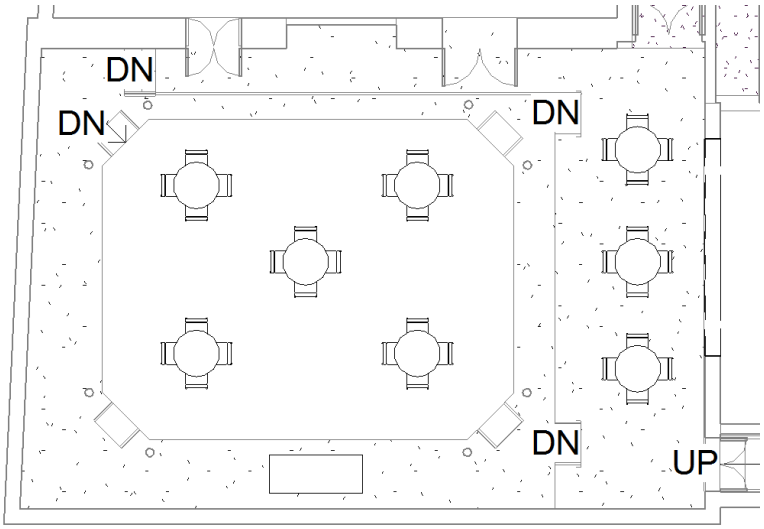


Figure 25: Seating with Dot Tables

Figure 26: Rendering of Dot Tables Seating

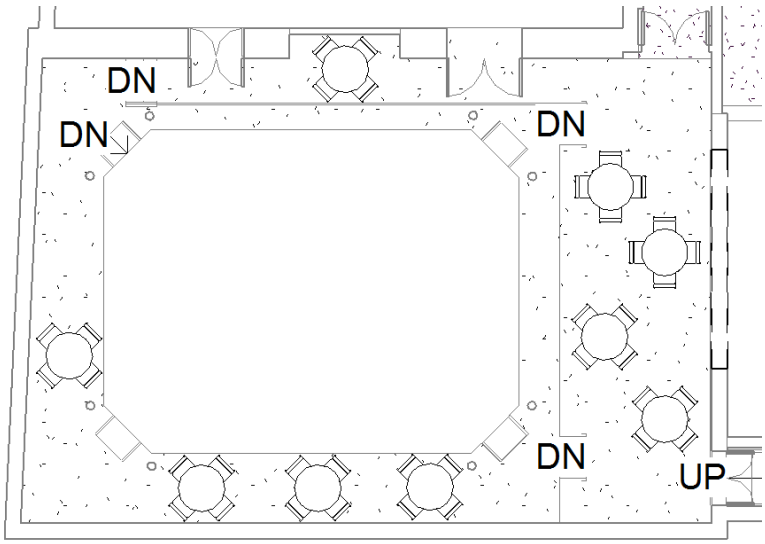


Figure 27: Seating for Exterior Dot Tables

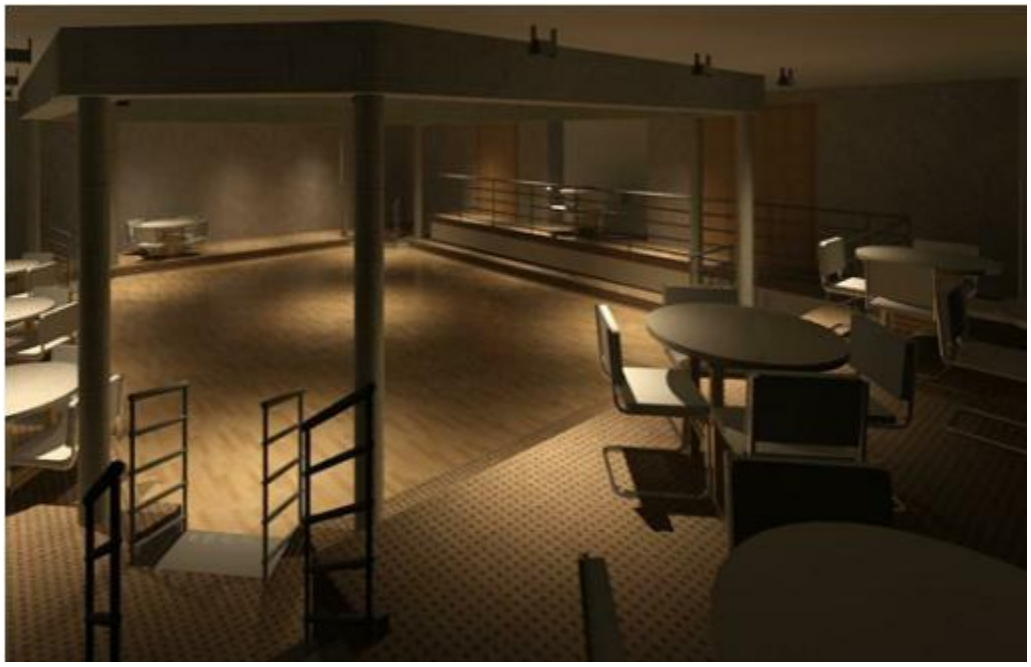


Figure 28: Rendering for Exterior Dot Tables

Another ongoing issue in the Workshop is their accessibility. They currently do not have an elevator and that is a big problem in their everyday use. Most of the studios are upstairs and their theater is down in the basement. They have a chair lift but it is outdated and takes up space in the stairway. Therefore, the staff of the Workshop can use the model to look for areas that an

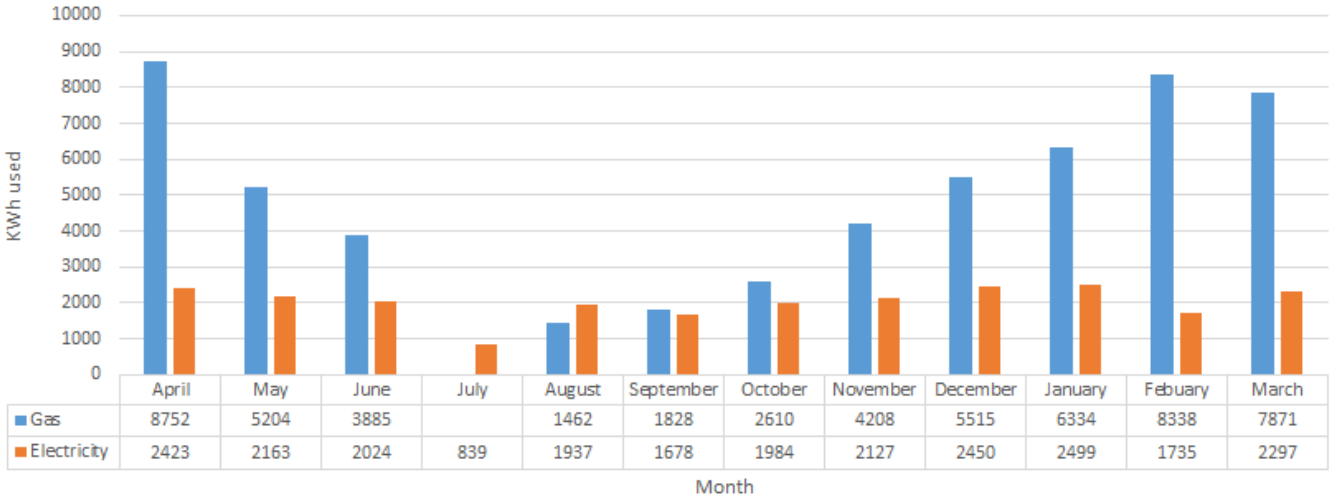
elevator could be installed. This model is going to allow them to implement renovations to the building in a way they can visually see them.

4.4 Energy Analysis

This section details our energy analysis findings. We collected the utility bills of the past twelve months and analyzed the data for electricity and gas use. In addition, we calculated energy consumption by the kiln, the water heater, and the boiler. We examined various options to reduce energy consumption and expenses in the building based on our energy audit and conversations with an energy expert, Jim Lott of Encraft.

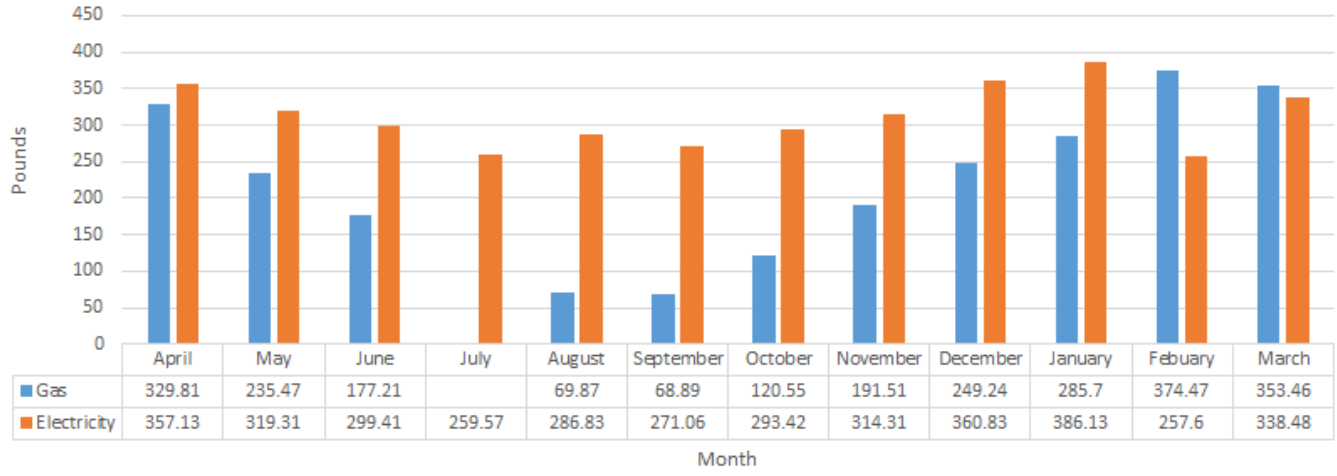
4.4.1 Gas and Electricity Use Based on Utility Records

Based on monthly utility bills for April 2015 through March 2016, we calculated the energy usage by month in kWh (Figure 29) and in pounds (Figure 30). Figure 29 shows that gas consumption is highest in winter and early spring when the gas fired central heating is on, while electricity usage varies much less from month to month since it is used primarily for lighting. While the annual consumption of gas (56007 kWh) is much higher than the annual consumption of electricity (25055 kWh) in terms of kilowatt-hours, the annual cost (Figure 30) of electricity (£3744.08) is much higher than the cost of the gas (£2546.18) because electricity costs 14.46p/kWh compared with gas at 4.43p/kWh.



	April	May	June	July	August	September	October	November	December	January	Febuary	March
Gas	8752	5204	3885		1462	1828	2610	4208	5515	6334	8338	7871
Electricity	2423	2163	2024	839	1937	1678	1984	2127	2450	2499	1735	2297

Figure 29: Utility Usage in kWh



	April	May	June	July	August	September	October	November	December	January	Febuary	March
Gas	329.81	235.47	177.21		69.87	68.89	120.55	191.51	249.24	285.7	374.47	353.46
Electricity	357.13	319.31	299.41	259.57	286.83	271.06	293.42	314.31	360.83	386.13	257.6	338.48

Figure 30: Utility Usage in Pounds

4.4.2 Detailed Gas and Energy Consumption Based on Audit

We calculated energy consumption of the kiln, gas boiler, immersion water heater, lighting and Café Bliss based on an audit of energy ratings for equipment and estimates of typical usage. We used these numbers to create an overall energy consumption breakdown chart that can be seen below in the summary.

Kiln

The electric kiln is a Cromartie SC220, which operates at a maximum temperature of 1000° C. The kiln runs at 230/400 V and creates a load of 16 kW. This information was listed on the nameplate of the kiln, but it is an old model and we could find no additional operating specifications online. Staff told us the kiln is only fired once a week currently, but they are planning on using it twice a week, once for clay and the other for glass. We determined that clay takes about 6 hours to fire and glass takes about 12. The kiln however cycles through different temperatures throughout the firing process so in our calculations we averaged the power of the kiln to 70% rather than full power. We then calculated how much electricity is used by the kiln per month if it is fired twice a week and found that firing clay uses about 268.8 kWh per month, which is about £9.72 per fire. Firing glass uses about 537.6 kWh per month, which is about £19.44 per fire. The cost and electricity used to fire glass is not included in our current electricity consumption numbers as they have not started to fire glass yet, but they are planning to in the next coming weeks.

Gas Boiler

The boiler is an Ideal Concord CX 275, it has a heat input of 100.7 kW, and a heat output of 80.6 kW, which gives it an efficiency of 79% and a ‘D’ rating according to SEDBUK (Seasonal Efficiency of Domestic Boilers in the UK). After figuring out the heat input, we estimated how many hours per week it is used by looking at the utility bills, asking the staff and estimating based on our observations of heat usage. Since it is set to 2.5 out of 6, we estimated that the boiler runs at 40% of its power and is run 4 hours per day. With these numbers, the boiler’s gas consumption per month is about 4,833.6 kWh, which costs around £214.13. The boiler consumes about 90% of the gas in the whole building.

Immersion Water Heater

The immersion water heater is a Backersafe BS327C with a capacity of 3 kW and a voltage of 240 V. The hot water tank is 3 feet tall and holds about 200 liters of water. There is a cold water tank that supplies water to the hot water tank to be heated whenever it needs to refill. The tank was well insulated and the pipes were mostly insulated. There is a timer next to the water heater which is not currently in use. Using the wattage, we calculated the electricity consumption of the water heater. We estimated how many hours per day the water heater is on by observing and asking staff how often hot water is used. Based on this we estimated that the water heater is on roughly 5 hours per day, as it turns on and off depending on the temperature and level of water in the tank. This adds up to 450 kWh per month which is about £65.10, and is about 22% of the electricity bill.

Lighting

After reviewing the results from the lighting audit, we found that some of our initial hypotheses were correct but some were not. Our initial estimate of how much electricity the lights use in the building were accurate with our findings. As shown above the lighting in the building is about 20% of the overall usage. The lighting audit consisted of walking through each room and taking inventory and details of every light bulb and fixture. We found that the lights were not consistent throughout the building and about 34% of all the fixtures were either missing bulbs or the bulbs were dead. In total, throughout the building, there are 181 bulb placements but the Workshop only uses 119 bulbs. The energy used by these 119 bulbs per month is about 416 kWh which costs around £60.19.

Café Bliss

The Café Bliss audit consisted of a walkthrough of their kitchen noting any electrical or gas appliances and any information that would be useful for us to calculate their electric/gas consumption. We performed the audit on April 13th close to closing time, to limit the impact on daily routines. The appliances they have include a stove, an industrial fan, a kettle, 2 microwaves, a dishwasher, 4 fridges, a deep fryer, an espresso machine, a coffee machine and a freezer downstairs in the basement. The audit checklist can be found in Appendix P. After walking through the kitchen and noting all of the appliances they have along with their

respective wattages, we asked the staff for an estimate of how many hours they think each appliance is run per day, and then estimated how many hours each appliance is run per month. Using this information we calculated how much electricity and gas the café consumes per month. Based on our calculations the café consumes about 45% of the total electricity used in the building and 10% of the total gas. This is about £140 from the electricity bill and about £22 from the gas bill on average each month. This is useful information for the Workshop to know as they did not previously have an estimate of the utilities used by the café.

Summary

After calculating the amount of energy used for the lights, kiln, water heater, and Café Bliss, we found what percentage each component is in both Great British Pounds (GBP) and kilowatt-hours (kWh). This breakdown can be seen in Table 1 and Figure 31 below. The amount of gas used by the stove and boiler was also broken down into percentages, and can be seen in Table 3 and Figure 32

	Lighting	Kiln	Water heater	Café Bliss
GBP/mo	62.09	40.25	67.39	142.28
GBP/yr	745.07	482.99	808.72	1707.30
kWh/mo	415.35	269.24	450.83	951.75
kWh/yr	4984.15	3230.93	5409.93	11420.97

Table 2: Electricity Breakdown

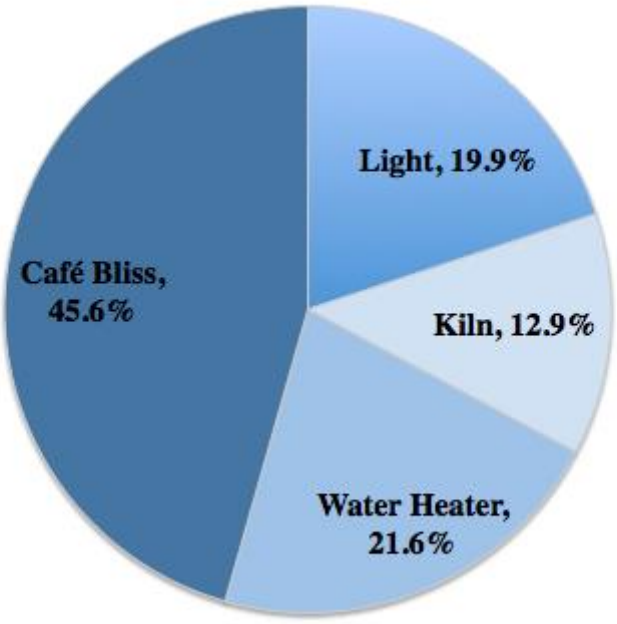


Figure 31: Electricity Breakdown

	Stove	Boiler
GBP/mo	20.37	191.81
GBP/yr	244.43	2301.75
kWh/mo	448.06	4219.19
kWh/yr	5376.67	50630.33

Table 3: Gas Breakdown

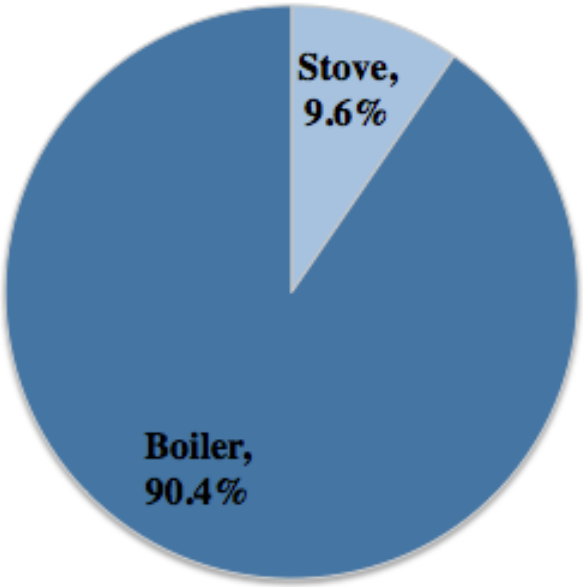


Figure 32: Gas Breakdown

4.4.3 Advice from an Energy and Sustainability Expert

During the first initial meeting at the Workshop, Jim Lott pointed out issues with some of the current construction of the building such as all the windows are single glazed, most of the doors and windows are very drafty, the exterior walls are solid brick without any insulation, and most of the exposed piping for the radiators are not insulated. He said that these are quick, easy, and mostly low cost changes that could be made.

Another component he told us to consider is if a room needs to be heated we should inspect if it is able to be heated. The comfortability of humans is not impacted by the temperature of the air surrounding them but instead the temperature of the surfaces because humans feel warm by transferring heat between their skin and the surfaces near them. In the basement of the Workshop there are radiators that are attempting to heat the air instead of the surfaces of the walls. Here he told us to look into electrical radiant heaters that are mounted on walls and heat the surfaces. These are fairly low in cost and are good devices that can be turned on and off as needed. When analyzing the boiler he told us to find if there are currently any issues with it

because if not, then it would probably not be beneficial for them to spend a large amount of money on installing a new unit.

The last topic he mentioned was that we should calculate cost benefit analyses for and possibly recommend for the Workshop to invest in. The first thing he recommended was looking into the electrical radiant heaters for the basement instead of the radiators they currently have that were mentioned above. He also told us that we need to perform heat loss calculations for each room and the entire building. Jim also noted that the lighting electricity usage was most likely more than we had first expected so we needed to do an audit for the lighting as well.

Later that evening we met back up with Jim Lott. We then asked him if he thought that it would be a good idea for the Workshop to purchase a new boiler or a combination boiler. He said if the water heater were to run out of hot water quite often it may be helpful, but it would not necessarily save any energy. He also said that we would have to take into account having to repipe either the gas or water depending on where the Workshop would want to install the combination boiler.

4.4.4 Energy Reduction and Cost Savings Options

From our findings above we researched different options to replace the current systems and focused on the initial costs and energy savings. These options included replacing the boiler and water heater, retrofitting LED lighting, replacing windows, any additional cheap solutions, and reviewing alternative utility providers. We took into account their current systems and reviewed options to either replace them or add any energy saving options.

Replacing the boiler and water heater

To find the ideal size of the boiler we had to calculate the peak heating load of the building. To do this we used the “heating and cooling load calculations” feature in REVIT®. This software runs an analysis of the building with all the specific materials that make up the building with the main ones being the glazing of the windows. The first analysis we ran was with single glazed windows to determine the peak heating load. This value came to 37,158 W. The next step was theoretically changing all the single glazed windows to double glazed windows. When we did this, the new peak heating load came to 34,729 W. These values are important

when finding the appropriate size boiler for the Workshop. This also shows that if the Workshop changed all their windows to double glazed windows that the heating load would decrease by 10%. Appendix S shows the Building Summaries of the single glaze and double glazed peak heating load calculations. In addition to using REVIT® to calculate the peak heating load of the building, we decided to manually calculate this number as the program does not take into consideration floors that are underground such as the theater. The new value for the peak heating load was 52.9 kW. This is the size of the new boiler the Workshop should get in order to heat the whole building.

With the peak heating load numbers we researched boilers that would be appropriate for the Workshop. Based on the 52.9 kW peak heating load for the whole building, the Workshop could run off a boiler that is 60% of the size (60 kW) of the current one they have (100.7 kW). If they were to install electric radiant heaters for the walls in the basement then they could cut off the water supply to the radiators in the basement and use a boiler that is about 40% of the size (40 kW) of the current one they have. This is according to the 37.2 kW peak heating load mentioned above. The price of installing electric radiant heaters is £311. When researching new boilers we focused on Worcester Bosch boilers since that is the Workshop's manufacturer of choice. They do not make 60 kW combination boilers so we found a condensing boiler that would replace their current one but they would have to keep their water heater. The model is GB162 65 kW. If they decide to get electric radiant heaters for the basement the boiler that we found is the Greenstar 42CDi Classic, also by Worcester Bosch, which is a 42 kW combination boiler. The current boiler costs about £214.13 to run per month. If they decide to get the GB162 65 the price of running it would be about £138.22 per month. If they decide to get the Greenstar 42CDi Classic the price of running it would be of £89.31 per month. If they get the Greenstar 42CDi Classic they can get rid of their water heater, which would eliminate the cost of the electricity consumed by it but they would need to get electric radiant heaters which, if run 8 hours per day, would cost £41.66 per month.

Retrofitting LED Lighting

We then performed cost benefit analysis calculations if the Workshop decided to replace most of the bulbs with LEDs. For this calculation we changed about 66% of the bulbs currently being used. We didn't change 34% of the bulbs because these bulbs were not a common size and

were found to be already energy efficient. The price of each spotlight was of £1.79 each which we found from LED Hut, a company that produces high quality low energy bulbs. These spotlights are 5.6 W each. The price of the tube lights was of £11.17 each and we obtained it from RS, which is a company that sells a range of electrical and mechanical products. These tube lights are 19 W each and fit into the same fixtures the Workshop already has. The cost of changing the 32 spotlights and 46 tube lights would be £571.10 but would only use about 236 kWh a month compared to the current 416 kWh used on lighting. The price of these per month would be £34 which means the Workshop would save £26.09 a month on lighting. We calculated that the payback period of changing the 78 light bulbs to LEDs would be about 22 months. These calculations can be seen in Appendix O1. In Figure 33 below, you can see the new energy breakdown if the Workshop we to install these LED bulbs.

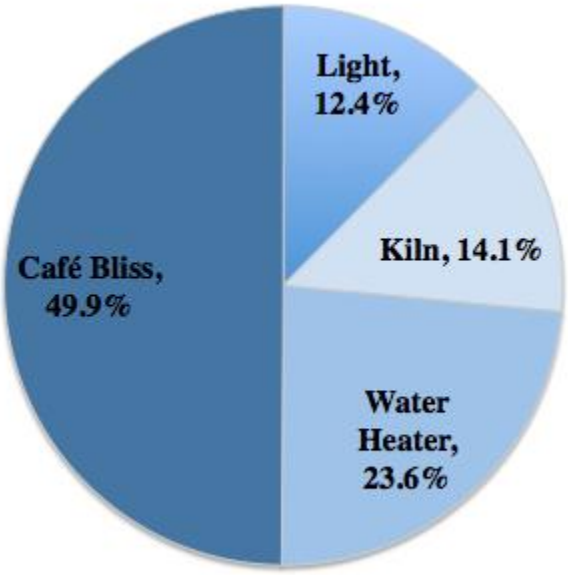


Figure 33: Electricity Breakdown with new LED Lighting

Replacing windows

The next option looked into was replacing all the windows. Without taking the difference in size and appearance of windows in the Workshop, the cost of buying new windows to replace all the ones currently in the building with standard timber double pane windows would be £9,078. This number does not include the cost of installation, as it is up to the Workshop to find

someone qualified to volunteer for this job, or to find someone to install them. As a secondary option to replacing windows, draught proofing was also looked into. It was estimated that they would need about 10 meters of stripping for each room, and found that this would cost them around £77. This does not need to be installed by someone else, because it is simple enough to do by yourself, meaning that there would be no additional cost towards this.

Additional inexpensive solutions

After noticing the lack of insulation in the loft as well as on the piping, it was found that insulating the pipes would cost about £8.90, and this would be easy for someone at the workshop to complete. The loft insulation would cost about £175, and could also be easily completed by a Workshop member. The last option investigated was motion sensors for lights. These would cost £90 for just the sensors, and they would need an electrician to wire them into the system. The calculations and items recommended can be seen in Appendices N1-N5.

From the list of recommendations in Appendix N, it was found that the Workshop has many smaller options as well as big ones for saving money and being more comfortable in rooms. The first issue that was looked into was the feasibility of solar panels. They would be able to get 14 panels, costing about £4,200 for the panels and installation, in addition to £1,200 for maintenance and insurance, which would be paid back in about 12 years. Draught kits for doors were also looked into. These would be small strips at the bottom of the door to help prevent air escaping. To get these for all 7 exterior doors would cost between £52 and £90, depending on the material selected.

Due to the cold nature of the theater, additional heating was looked into and found that the best solution were thermally conductive electrical wall heaters. These cost £179 for the first panel and £132 for each additional panel. The workshop would only need one of each, coming to a total of £311.

Alternative utility provider

Using the 2015/16 utility bills, we compared the Workshop's current energy prices from Utility Warehouse to other providers around Worcester. We found that Utility Warehouse was ranked 5th out of 22 of the top energy companies in Great Britain with a customer score of 75% as seen in Figure 34 below. This number is based on 5 categories (customer service, value for

money, billing system, complaints handling, and energy saving help). After exploring further details about the 4 companies with higher ratings than Utility Warehouse, we concluded that they might not want to change, however. The company in first place, Ovo energy, was rated very high in terms of value for money and is committed to supplying energy that is 33% from renewable energy sources, but Ovo only offers electricity services to businesses. The second company, Good Energy, is committed to being 100% renewable energy, but also provides only electricity. Ecotricity, the third company, is committed to becoming 100% renewable and a percentage of bills go towards this goal. They supply both electricity and gas to small businesses, but they were rated poorly on the 'value for money' category. This may be an option in the future to further the Workshop's commitment to sustainability, but it is not a good option financially at present. Ebico stands more as a provider for second/vacation homes, or for places that use extremely small quantities of gas and electricity. The last company, Utilita, is tied for 5th with Utility Warehouse, but is a pre-paid type company. This means the Workshop would pay for the energy they think they are going to use for the month, and if they went over that amount they would need to add money to their account before they could continue receiving services. While a service like this could be useful in forcing the Workshop to change its energy consumption patterns, it would put unnecessary stress on the management, as they currently have direct debit to pay for their energy, and this would force someone to manually pay each month, as well as regularly monitor their usage.

Supplier	Customer service	Value for money	Bills (accuracy and clarity)	Complaints handling	Helping to save energy	Which? customer score
1. Ovo Energy	★★★★☆	★★★★☆	★★★★★	★★★★★	★★★★☆	82%
2. Good Energy	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	81%
3. Ecotricity	★★★★☆	★★★☆☆	★★★★☆	★★★★★	★★★★☆	77%
4. Ebico	★★★★☆	★★★★☆	★★★★☆	n/a	★★★★☆	76%
5. Utility Warehouse	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★☆	75%
= Utilita	★★★★☆	★★★★☆	★★★★★	★★★★★	★★★★☆	75%
7. Flow Energy	★★★★☆	★★★★☆	★★★★☆	n/a	n/a	73%

Figure 34: Utility Supplier Chart (Which? Switch, 2015)

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5.0 Conclusions

The main thing we learned from our time at the Worcester Arts Workshop is that no matter what is happening, you should always have a positive outlook. Like other community art organizations in England, the Worcester Arts Workshop is under tremendous financial difficulties due to budget cuts and changes in funding. Even though everything may seem chaotic at times and they often struggle financially, no one loses hope. The organization has managed to survive and provide the community with a vibrant venue for arts classes and events for the past 30 years and has strong support from staff, volunteers, patrons, and other stakeholders in the community. The staff, trustees, and volunteers are committed to enhancing the social, economic, and environmental sustainability of the Workshop.

From our surveys, we learned that the Workshop's outreach is not as good as it could be due to participants being unaware of classes or events. Our survey of the public confirmed our assumption that relatively few people in the community know about the Workshop, although we were actually surprised by the proportion of people who are 'in the know', 20/100 (20%). We also conducted a survey of attendees at the event *This Land* and a survey of 1300 people on the Workshop's email list. The surveys revealed that more people would be interested in attending classes on painting, drawing, and yoga, especially if these were offered at more convenient times, such as in the evening and on the weekends. The surveys also revealed that live music and theater shows were the events most people would be interested in attending. With this information and more examination of people's interest, the Workshop will be able to implement classes and events that would be widely popular. With regards to sustainability, the surveys indicated that the patrons believe the Workshop should endeavor to become more sustainable, but their notion of sustainability emphasized long-term, economic sustainability (e.g, through 'community mutualism') rather than the environmental or social aspects of sustainability.

From various interviews, meetings, and ad hoc conversations held with stakeholders, we learned information about the Workshop that would have otherwise been overlooked. The main goals of the Workshop are to make their building the most sustainable building in Worcester and to buy the building from the County Council. For the organization to achieve these goals, more revenue and better organization and management will be key. The stakeholders emphasized that hiring professional managers and reducing turnover will be essential to making the Workshop

run more smoothly. Along with this, they also emphasize the need to bring in a larger, more diverse group of participants which would not only increase revenue but also allow the Workshop to have a greater impact on the community.

The next important conclusion is that the Workshop has suffered from multiple staff changes causing a lack of consistent management and oversight of operations. Implementation of set instructions on how things are done will help incoming staff members understand the current practices, and if there is an administration change again, the new administrator will know how the Workshop was run previously. This will also set a standard for tasks throughout the Workshop, even if they seem trivial.

The Workshop's website was lacking updated information on classes and events so we improved the functionality and usability of the website through a Google Calendar. This will allow for a streamlined process of updating and collecting information on both sides. These improvements will create an interactive experience, that allows website visitors to scroll over the calendar, and view information about classes offered at different times. The website will also now allow people to view room availability and request rooms to hire directly.

We found discrepancies between the floor plans they had and the actual building, therefore, we used REVIT® to create an accurate floor plan and a 3D model of the current building. The Workshop can use the model to present the seating options to theater companies and others wishing to use the venue, as well as other information such as clearances for moving equipment and sets in and out of the building. This model will also help the Workshop explore possible locations for them to install a lift in the future.

From the energy audit we learned that the Workshop's energy issues are mostly due to the age and upkeep of the building. Originally, we thought these issues were caused by people around the Workshop not paying attention to energy use, but instead found that the users care immensely, and implementing changes for sustainability will not be hard. Many of our recommendations for the Workshop's energy use are short-term and low in cost. However, like any old building, there are some recommendations we have made that will be a bit more costly. Combining the recommendations for changes in the building while remaining energy cautious in all activities, the Worcester Arts Workshop's goal of becoming the most sustainable building in the city is far less lofty than at the start of our project.

6.0 Recommendations

Based on the conclusions above, we have developed the following recommendations for the Worcester Arts Workshop. These suggestions are divided into the three pillars of sustainability: social, economic, and environmental and are designed to aid the Workshop in achieving their goal of becoming the most sustainable building in Worcester.

6.1 Promoting Greater Inclusion and Social Sustainability

6.1.1 Marketing and Outreach

We recommend that the Workshop develop a more extensive marketing and outreach effort to attract a broader and more diverse audience (including students at the University of Worcester) for classes and events, using its website, social media, and other channels.

6.1.2 Events and Classes

We recommend that the Workshop explore further what types of classes and events would be more engaging and attractive to a broader audience (including students). They should trial these events and classes and solicit attendee feedback before developing a complete schedule.

6.1.3 Scheduling

We recommend the Workshop develop a schedule of classes and events that are more convenient for their patrons, including offerings on evening, weekends, and holidays.

6.1.4 Lift Access

We recommend that the Workshop explore options for making the facilities more accessible. A possible solution for a lift location would be where the current boiler is if they invest in a combination boiler and place it where the water heater is currently. The REVIT® model is a good tool for the Workshop to be able to explore more options for locations to install a lift.

6.2 Promoting Economic Sustainability

6.2.1 Website

For the changes made to the website, it is recommended that the Workshop continue to improve the organization of information. Setting up email filters for contact us forms will allow for easier access to information as well as a quicker response time to inquiries and issues. We also recommend adding pages where people can buy tickets for events and sign up and pay for classes online. The use of links throughout the website to redirect to other pages will also streamline the user experience throughout and increase the website's efficiency, making it more user friendly. This will increase the visitor experience, which will increase the likelihood of returning to both the website and the workshop. The website should be a primary vehicle for enhancing the Workshops marketing and outreach efforts.

6.2.2 Facility Assessment and Modeling

The 3D model can be used to promote economic sustainability in a few different ways. We recommend that the Workshop posts floor plans of the basement and theater area on the website. This is going to allow outside parties that are looking to rent out the space to know the size of the stage they have to perform on as well as how narrow the hallways are for them move in and out their equipment. We also recommend posting the renders of the different seating arrangements on the website to show the versatility of the room.

6.2.3 Staffing

The workshop should endeavor to recruit and retain more paid, professional staff to ensure the quality and continuity of the administration and the services provided.

6.3 Promoting Environmental Sustainability

For our environmental sustainability recommendations we decided to divide them into short-term and long-term solutions. We did this because some of the recommendations that we have put together are more costly and take more time to implement than others. These

recommendations range from small things like draft proofing doors to bigger solutions like replacing the boiler. These recommendations will not only make the Workshop more environmentally sustainable, but will also make the building feel more comfortable and save them money in the long run.

6.3.1 Short-term Solutions

The first of our short-term recommendations would be to replace the lightbulbs in the Workshop. They could do this as the current ones burn out and slowly replace all of them. We recommend they buy LED standard bulbs from LED Hut and purchase the tube bulbs from RS Even though the lights should be replaced, we do not recommend that the Workshop invest in motion sensors. This is because the rooms are normally used during the day, meaning the lights do not need to be turned on most of the time people are in there.

Another short-term solution that we have would be to install insulation in the lofts and on the radiator pipes in the pottery room. This would reduce the overall heat loss from the ceiling in the building, and control the amount of heat being used by rooms, which would make it feel more comfortable. For the windows it is recommended that they invest in weather-stripping instead of replacing all the windows, but as windows need replacing, they should replace them with double pane windows. Along with weather-stripping the windows, the Workshop should also invest in door draught proof kits.

While we have looked into different utility companies for the Workshop, we do not recommend they switch providers at this time. This is based on things such as cost for value and the ability to get both gas and electricity. However, the Workshop can eventually look into companies such as Good Energy to help promote sustainability through 100% renewable energy sources.

The last short-term recommendation for the Workshop is to install electric wall mounted heaters in the theater space. The Workshop would only needs 2-3 of these to heat the space, they come in colors to match the walls of the theater, and would alleviate some of the work from the boiler, thus enabling them to get a smaller one (40 kW).

6.3.2 Long-term Solutions

There a few long term items that the Workshop should consider looking into now because they will be more expensive. One of their big energy using appliances is the kiln. We would not recommend buying another kiln until it is needed, only because of the big initial cost and they do not use it enough to have a reasonable payback period. However, when they start firing an additional time for the glass class, we recommend that whichever firing is second should be done within 24 hours of unloading the first one. This is because the kiln will not have to reheat from room temperature and will use less energy to heat to the needed firing temperature.

The next appliance they should be aware of is their water heater. After analyzing the water heater we have found that it is not worth replacing unless it breaks. The only time we would recommend them purchasing a new water heater would be when they purchase their new boiler and instead purchasing a combination boiler that has the water heater and boiler all in one unit.

Their biggest user of gas is their boiler. We recommend that they invest in a 60 kW boiler. The Workshop said they preferred the company Worcester Bosch, therefore, we recommend the GB162 65 kW boiler, which is a condensing boiler, and they keep their water heater. However, since Worcester Bosch does not manufacture large enough combination boiler, if the Workshop were to implement the radiant heaters in the basement they could purchase a smaller boiler. If this were the case, we recommend the combination boiler Greenstar 42CDi Classic that could also replace the water heater.

If the Workshop were to buy the building, they would be able to look into larger investments such as solar panels. These more extensive long-term fixes are expensive and additional outside funding and grants will need to be looked into to afford these recommendations. The Workshop should look for funding from places such as The National Lottery and the Duckworth Worcestershire Trust, as well as holding fundraisers at the Workshop and in the community.

References

Arts Council England, (n.d.). *The Value of Arts and Culture to People and Society* http://www.artscouncil.org.uk/sites/default/files/download-file/Value_arts_culture_evidence_review.pdf

Arts Development: UK. (2015, September 04). Arts Development UK Local Authority Arts Investment & Partnership Survey 2015. Retrieved from http://artsdevelopmentuk.org/2015/09/arts-devarts-development-uk-local-authority-arts-investment-partnership-survey-2015/

Brown, M., The Guardian (May 2013) *Arts and Culture Worth More Than £850m to UK Export Trade.* Retrieved from http://www.theguardian.com/culture/2013/may/07/arts-worth-millions-uk-economy

Buckley, C., Julie's Bicycle, (2015) *Fit For the Future: Investing In the Environmentally Sustainable Buildings, A Guide for the Arts.* Retrieved from https://my.wpi.edu/bbcswebdav/pid-612612-dt-content-rid-3194788_1/courses/ID2050-C16-C13/Julies_Bicycle_Practical_Guide_to_Communicating_Sustainability_015.pdf

Café Bliss. (n.d.) *About us.* Retrieved on February 8, 2016, from http://www.cafébliss.moonfruit.com/about-us/4544081770

Centre for Sustainable Energy, (n.d.) *Energy Survey.* Retrieved from https://www.cse.org.uk/downloads/file/energy-survey-proforma-enabled.pdf

Charity Commission. (2015, March 31). *517183 – Worcester Arts Workshop Limited.* Retrieved from http://apps.charitycommission.gov.uk/Showcharity/RegisterOfCharities/CharityWithoutPartB.aspx?RegisteredCharityNumber=517183&SubsidiaryNumber=0

DeMarinis, N., Dinwoodie, S., Kelley, R., Parker, H., (2011, June 25). *Recruitment and Energy Audits of Small and Medium Enterprises in Reigate.* (Undergraduate Interactive Qualifying Project No. E-project-062211-112934). Retrieved from Worcester Polytechnic Institute Electronic Projects Collection https://www.wpi.edu/Pubs/E-project/Available/E-project-062211112934/unrestricted/Recruitment_and_Energy_Audits_of_SMEs_in_Reigate.pdf

Evans, B., Richmond, T., & Shields, J. (2005). Structuring Neoliberal Governance: The Nonprofit Sector, Emerging New Modes of Control and the Marketisation of Service Delivery. Retrieved March 30, 2016, from http://www.sciencedirect.com/science/article/pii/S1449403505700503

Gregory, J. (2004), "*Rehabilitation-new ways for older housing*", New South Wales Department of Housing. Retrieved from: www/housing.nsw.gov.au/rehab.htm.

Hutchinson, D. (2015, July 21). DCMS warned to prepare for 40% budget cut | News | The Stage. Retrieved from https://www.thestage.co.uk/news/2015/department-culture-warned-prepare-40-budget-cut

Ireland, D., (2005). How to Rescue a House: turn an Unloved Property into Your Dream Home. London: Penguin Books

Ledbury Research. (2009). London: Barclays Wealth; *Tomorrow's Philanthropist.* Retrieved from: https://www.home.barclays/content/dam/barclayspublic/docs/Citizenship/Reports-Publications/tomorrows-philanthropist.pdf

Macnaughton, J., White, M., & Stacy, R., (2005). *Researching the benefits of arts in health,* Health Education, Vol. 105 Iss: 5, pp.332 – 339, Retrieved from http://www.emeraldinsight.com/doi/full/10.1108/09654280510617169

Mermiri, T. (2010). *Arts & Business: Arts Philanthropy: The Facts, Trends and Potential,* Retrieved from http://www.aandbscotland.org.uk/documents/2012-06-12-10-42-58-31-Arts-philanthropy-facts-trends.pdf

Mermiri, T. (2009). *Arts and Business: Market Trends 2009,* Retrieved from http://www.aandbcymru.org.uk/uploads/Market_Trends_2009.pdf

Mermiri, T. (2010). *Arts & Business: Private Investment in Culture 2008/09: the arts in the 'new normal',* Retrieved from http://artsandbusiness.bitc.org.uk/system/files/thesurvey-2008-09.pdf

Your National Lottery. (n.d.). About the distributors. Retrieved from http://www.lotterygoodcauses.org.uk/funding

Needlands, J., Belfiore, E. Firth, C., Hart, N., Perrin, L., Brock, S., Holdaway, D., Woddis, J., (2015). Enriching Britain: Culture, Creativity and Growth. p.12, Retrieved from http://www2.warwick.ac.uk/research/warwickcommission/futureculture/finalreport/warwick_commission_report_2015.pdf

Peredo, A. M., & Mclean, M. (2006). Social entrepreneurship: A critical review of the concept. *Journal of World Business, 41*(1), 56-65. Retrieved March 28, 2016.

Pountney, D. (2015, April 21). Austerity and the arts: The hidden cuts that are bad for our cultural health. Retrieved from http://www.theguardian.com/music/2015/apr/21/david-pountney-arts-funding-bad-for-our-cultural-health

Power, A. (2008, November 7). Does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability?. Retrieved from http://www.sciencedirect.com/science/article/pii/S0301421508004709

Staricoff, R. L. (2004). *Arts in health: a review of the medical literature.* London: Arts Council England. Retrieved from http://www.artsandhealth.ie/wp-content/uploads/2011/08/AHReview-of-Medical-Literature1.pdf

Sontag-Padilla, L.M., Staplefoote, L., & Gonzalez Morganti, K. (2012). Financial Sustainability for Nonprofit Organizations (pp. 1-34, Rep.). Santa Monica, CA: RAND Corporation.

Stark, P., Gordon, C., Powell, D. (2013). Rebalancing Our Cultural Capital: A contribution to the debate on national policy for the arts and culture in England. Retrieved from http://www.artsprofessional.co.uk/sites/artsprofessional.co.uk/files/rebalancing_our_cultural_capital.pdf

Telegraph View. (2013, August 03). The arts can flourish without state funding. Retrieved February 14, 2016, Retrieved from, http://www.telegraph.co.uk/comment/telegraph-view/10220092/The-arts-can-flourish-without-state-funding.html

Vamos Theatre. (n.d.) *Company Profile.* Retrieved from http://www.vamostheater.co.uk/about-us/company-profile

Weerawardena, J., McDonald, R. E., & Mort, G. S. (2010, October). Sustainability of nonprofit organizations: An empirical investigation. Retrieved March 30, 2016, from http://www.sciencedirect.com/science/article/pii/S1090951609000455

Which? Switch. (2015, October). Energy companies satisfaction survey 2016. Retrieved April 25, 2016, from http://switch.which.co.uk/energy-suppliers/energy-companies-rated.html

Worcester Arts Workshop. (2015) *Worcester Arts Workshop Strategic Development and Business Plan*

Worcester Arts Workshop. (2015) *About us.* Retrieved from http://www.worcesterartsworkshop.org.uk/about/

Appendix

Appendix A - Preambles

City Council Interview Preamble:
We are a team of Worcester Polytechnic Institute students working in collaboration with the Worcester Arts Workshop to enhance their revenues and reduce their expenditures. The purpose of this interview is to elicit information from the council members regarding subjects relevant to our project. You are not obligated to answer any question asked; if you do not wish to answer a question, indicate this to the interviewer.

Mayor Member Interview Preamble:
We are a team of Worcester Polytechnic Institute students working in collaboration with the Worcester Arts Workshop to enhance their revenues and reduce their expenditures. The purpose of this interview is to elicit information from you (the Mayor) regarding subjects relevant to our project. You are not obligated to answer any questions asked; if you do not wish to answer a question, indicate this to the interviewer

Board Member Interview Preamble:
We are a team of Worcester Polytechnic Institute students working in collaboration with the Worcester Arts Workshop to enhance their revenues and reduce their expenditures. The purpose of this interview is to elicit opinions from the board members of the Workshop regarding subjects relevant to our project. You are not obligated to answer any question asked; if you do not wish to answer a question, indicate this to the interviewer.

Retrofit Expert Interview Preamble:
We are a team of Worcester Polytechnic Institute students working in collaboration with the Worcester Arts Workshop to enhance their revenues and reduce their expenditures. The purpose of this interview is to elicit information from retrofit experts regarding subjects relevant to our project. You are not obligated to answer any question asked; if you do not wish to answer a question, indicate this to the interviewer.

Workshop Patron Email Survey Preamble:

We are a team of students from Worcester Polytechnic Institute in the United States working in collaboration with the Worcester Arts Workshop. We are interested in your opinions about the events and classes at the Worcester Arts Workshop. Your answers will remain confidential and only anonymous data will be reported. Feel free to skip any questions you do not wish to answer. Thank you for taking the time to fill out this survey.

This Land Preamble Survey:

Thank you for attending the show, we are a team of students from Worcester Polytechnic Institute in the United States working in collaboration with the Worcester Arts Workshop. We are interested in your opinions about the show and the Worcester Arts Workshop. Your answers will remain confidential, and only aggregated anonymous data will be reported. Feel free to skip any questions you do not wish to answer.

Appendix B - Joy Squire Interview

1. How long have you served as a Councilor? How long have you been a board member?
2. What are other Councilors' opinions on funding for the arts? More specifically what do they think about the funding for the Workshop?
3. Why was the funding cut?
4. What criteria is used when deciding if an organization should receive funding or not?
5. Have other arts organizations been affected by funding cuts in Worcestershire?
6. Does the Workshop have a strong presence in the community? Does it impact the community positively?
    a. Do you think it has the potential to have a greater presence and impact on the community?
7. What do you think about the Workshop trying to become more sustainable? Especially their goal to become "the most sustainable building in Worcester"?
    a. Is it feasible for them to accomplish this?

With regards to being a board member….

8. What do you think about the current operation and financial state of the Workshop?
    a. What can they improve on?
9. You have been a board member for _____ years, is there anything from the past that could benefit them to do again?
10. What is the mission of the Workshop?
    a. Do you think that they are holding true to it?
11. What direction do you want the Workshop to go?
    a. What are some strategies you have thought of to help them move in that direction?
12. What do you see as the major goal the Workshop should strive to accomplish?
    a. What will be the biggest obstacle along the way?

Appendix C - Matt Jenkins Interview

1. How long have you served as a Councillor? How long have you been a board member?
2. Why did you become a member on the board of trustees?
3. Do you actively go to events hosted by the Workshop?
4. What do you think about the funding cuts to the Workshop?
5. Does the Workshop have a strong presence in the community? Does it impact the community positively?
    a. Do you think it has the potential to have a greater presence and impact on the community?
6. As a Green Party member what do you think of the Workshop's goal to become "the most sustainable building in Worcester"?
    a. Is it feasible for them to accomplish this?
    b. What are some options for them to accomplish this?
    c. What are some other funding options that could be useful for them?

With regards to being a board member….

1. What do you think about the current operation and financial state of the Workshop?
    a. What can they improve on?
2. What is your role as a board member?
3. What direction do you want the Workshop to go?
    a. What are some strategies you have thought of to help them move in that direction?
4. What is the Workshop's mission?
    a. Are they doing well at following it?
5. What do you see as the major goal the Workshop should strive to accomplish?
    a. What will be the biggest obstacle along the way?
6. Do you know if the building is listed?

Appendix D - Mayor of Worcester Interview

1. How familiar are you with the Worcester Arts Workshop?
2. What are your thoughts on the workshop?
3. How well known do you think the Workshop is around Worcester?
4. Do you think the Workshop contributes positively to the surrounding businesses/ the city in general?
5. Do you think arts organizations should look to the government for funding?
    a. Is there anywhere else they can go?
6. How have non-profits successfully [marketed] themselves in the past?
    a. Are these non-profits art based?
    b. Are they still successful?
    c. Can we have their names to possibly go talk to them?
7. Do you know of any funding that the Workshop can look into to cover some costs?
8. The Workshop wants to become the most sustainable building in the city, do you think this is feasible?
9. Do you have any ideas for the Workshop to become more sustainable?
10. Is there a part of the council that helps businesses fund/become more sustainable/environmentally friendly?

Appendix E - Survey to Public

Hello, I am a student from the United States conducting research with the University of Worcester and Worcester Arts Workshop. Would you mind if I ask you just a couple of very short questions?

1. Have you heard of the Worcester Arts Workshop?
2. What do you know about the Worcester Arts Workshop?
3. Have you been to the Worcester Arts Workshop?
4. Why were you there?
    a. Class
    b. Event
    c. Café
    d. other

Appendix F - This Land Survey

Is this your first time at the Worcester Arts Workshop?

☐ Yes ☐ No

How did you hear about the show, *This Land*? (Tick all that apply)

☐ Word of Mouth ☐ The Workshop

☐ Street Advertising ☐ Fliers

☐ Social Media ☐ Worcester Arts Workshop website

☐ Other _____

Which of the following would you be likely to attend at the Worcester Arts Workshop in the next twelve months?

☐ Live Music

☐ theater Shows

☐ Dance Workshops

☐ Comedy

☐ Other _____

Are you currently enrolled in any of the Workshop's classes?

☐ Yes ☐ No (please explain)

Please indicate which classes you would be most interested in taking in the future. (Tick all that apply)

☐ Ceramics ☐ Drawings

☐ Painting ☐ Pilates

☐ Vamos theater Classes ☐ Open Studio

☐ None (please explain)

_____

What other events would you like to see the Workshop offer in the future?

Please indicate how strongly you agree or disagree with these following statements (where 1 means strongly disagree, 5 means strongly agree and DK means don't know)

- The Workshop should strive to promote sustainability in all of its activities

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ DK

- The Café Bliss should continue to resource locally grown foods

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ DK

- The Worcester Arts Workshop should seek substantial funding to make the building more environmentally sustainable

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ DK

Name: _____

Email Address: _____

Year of birth: _____

Gender:

☐ Female ☐ Male ☐ Do not wish to specify

Would you be interested in volunteering or the Workshop?

☐ Yes ☐ No

Would you be interested in helping to promote events?

☐ Yes ☐ No

Please note any other suggestions or comments you may have to help improve the Workshop:

Appendix G - Email Survey to the Workshop class and events patrons

First, we would like to ask you about Worcester Arts Workshop's adult classes.

Are you currently enrolled in any of the Workshop's classes?

- ○ Yes
- ○ No

If you answered no, is there a particular reason why not?

Your answer

Please indicate which classes you would be most interested in taking in the future. (Tick all that apply)

- ☐ Ceramics
- ☐ Drawing
- ☐ Painting
- ☐ Open studio
- ☐ Dance
- ☐ Yoga
- ☐ Pilates
- ☐ Music making
- ☐ None
- ☐ Other:

How many years have you been taking classes with the Workshop?

- ○ None
- ○ 0-1
- ○ 1-2
- ○ 3-5
- ○ More than 5

How did you originally hear about classes offered at the Workshop? (Tick all that apply)

- [ ] Word of mouth
- [ ] The Workshop
- [ ] Fliers
- [ ] Social Media
- [ ] Worcester Arts Workshop Website
- [ ] Other: _____

Have you taken any classes in the past? (Tick all that apply)

- [ ] Ceramics
- [ ] Drawing
- [ ] Painting
- [ ] Open studio
- [ ] Dance
- [ ] Yoga
- [ ] Music making
- [ ] None
- [ ] Other: _____

Thinking of the last class you took at the Workshop, how would you rate the following (where 1 = Poor and 5 = Excellent)

Quality of class

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Personal improvement

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Atmosphere

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Pricing

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Day & time the class

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Accessibility

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

How would you suggest the Workshop might improve the experience for participants in the future?

Your answer

NEXT

14% complete

Never submit passwords through Google Forms.

Here are a few questions regarding our children and young people's activities.

If this does not apply to you, please move forward to the next section.

What is the best day and time for children activities? (Tick all that apply)

- [ ] Weekdays 4pm - 6pm
- [ ] Saturdays 10am - 12pm
- [ ] Saturdays 2pm - 4pm
- [ ] Sundays 10am - 12pm
- [ ] Sundays 2pm - 4pm

What activities have your children attended at the Workshop? (Tick all that apply)

- [ ] Summer holiday activities
- [ ] Drama workshops
- [ ] Pottery workshops
- [ ] Painting/Drawing workshops
- [ ] Music workshops
- [ ] Half Term activities
- [ ] Weekend classes
- [ ] Other: _____

What activities would you bring your children to in the future? (Tick all that apply)

- [ ] Summer holiday activities
- [ ] Drama workshops
- [ ] Pottery workshops
- [ ] Painting/Drawing workshops
- [ ] Music workshops
- [ ] Half Term activities
- [ ] Weekend classes
- [ ] Other: _____

As a parent, what do you like about the atmosphere? (Tick all that apply)

- [ ] Tutors
- [ ] Location
- [ ] Range of activities
- [ ] Personal attention from tutor
- [ ] My child feels safe
- [ ] My child makes friends
- [ ] Other: _____

Do you have any suggestions on how to improve your child's experience in the future?

Your answer

Would you be interested in daytime activities for parents and under 5s?

- ○ Yes
- ○ No

What is the best time of day to hold these under 5s activities? (Tick all that apply)

- [ ] 10am - 12pm
- [ ] 12pm - 2pm
- [ ] 2pm - 4pm
- [ ] 4pm - 6pm
- [ ] Other: _____

Would you like to see more classes for young people?

- ○ Yes
- ○ No

If yes, what type of classes would you like to see for young people?

Your answer

BACK NEXT 28% complete

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Now we would like to ask you about Worcester Arts Workshop events.

Please answer the following questions on the events hosted by the Workshop.

Have you attended any events that the Workshop has hosted?

- ○ Yes
- ○ No

If you answered no, is there a particular reason why not?

Your answer

If yes, how many have you attended in the past year?

- ○ None
- ○ 1-2
- ○ 3-5
- ○ More than 5

What kind of events have you attended in the past year? (Tick all that apply)

- [ ] Live music
- [ ] Theatre shows
- [ ] Dance shows
- [ ] Theatre/dance workshops
- [ ] Lazy Sunday
- [ ] Splendid Cinema
- [ ] Cafe Bliss events
- [ ] Poetry evenings
- [ ] Open Mic evenings
- [ ] Political meetings
- [ ] None
- [ ] Other: _____

Which of the following would you be likely to attend at the Worcester Arts Workshop in the next twelve months? (Tick all that apply)

- [ ] Live music
- [ ] Theatre shows
- [ ] Dance shows
- [ ] Theatre/dance workshops
- [ ] Lazy Sunday
- [ ] Splendid Cinema
- [ ] Comedy
- [ ] Cafe Bliss events
- [ ] Poetry evenings
- [ ] Open Mic evenings
- [ ] Political meetings
- [ ] None
- [ ] Other: _____

How do you usually hear about the events hosted by the Workshop? (Tick all that apply)

- [ ] Word of mouth
- [ ] The Workshop
- [ ] Fliers
- [ ] Social Media
- [ ] Worcester Arts Workshop website
- [ ] Other: _____

Thinking of the last event you attended at the Workshop, how would you rate the following (where 1 = Poor and 5 = Excellent)

Quality of event

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Atmosphere

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Parking

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Convenience of purchasing tickets

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Ticket prices

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Day & time of the event

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Drink options at the bar

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Accessibility

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

How would you suggest the Workshop might improve the experience for participants in the future?

Your answer

BACK NEXT 42% complete

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Now we would like to ask you a few questions about Cafe Bliss.

Have you visited Café Bliss?

- ○ Yes
- ○ No

If no, is there a reason you don't use Café Bliss? (Tick all that apply)

- ☐ Opening times
- ☐ Food options
- ☐ Price
- ☐ Accessibility
- ☐ Other: _____

If yes, how often have you eaten at Café Bliss in the past year?

- ○ 1-5 times
- ○ 5-10 times
- ○ 10-20 times
- ○ 20+ times
- ○ Only once (not in the past year)
- ○ Only on event nights
- ○ Other : _____

How did you hear about Café Bliss? (Tick all that apply)

- ☐ Word of mouth
- ☐ The Workshop
- ☐ Workshop events
- ☐ Social media
- ☐ Cafe Bliss website
- ☐ WAW website
- ☐ Other: _____

What do you use Café Bliss for? (Tick all that apply)

- [ ] Coffee with friends
- [ ] Coffee or business meetings
- [ ] Lunch or other meals
- [ ] Cafe feminista
- [ ] Lazy sundays
- [ ] Veggie/vegan weekend
- [ ] One off events
- [ ] Other: _____

The café is considering expanding their times to fit in with events and classes at WAW. How likely are you to take advantage of: (where 1 = Highly unlikely and 5 = Highly likely)

Pre event meals

	1	2	3	4	5	
Highly unlikely	○	○	○	○	○	Highly likely

Pre class meals/drinks

	1	2	3	4	5	
Highly unlikely	○	○	○	○	○	Highly likely

How would you rate the following: (where 1 = Poor 5 = Excellent)

Food Quality

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Menu Variety

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Service

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Atmosphere

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Opening times

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Cleanliness

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

Experience

	1	2	3	4	5	
Poor	○	○	○	○	○	Excellent

Comments:

Your answer

How likely are you to recommend Café Bliss? (where 1 = Highly unlikely and 5 = Highly likely)

	1	2	3	4	5	
Highly unlikely	○	○	○	○	○	Highly likely

Comments:

Your answer

Please note any other suggestions you may have to help improve Café Bliss.

Your answer

BACK NEXT 57% complete

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Now we would like to ask you a few questions regarding sustainability of the Workshop.

What does sustainability mean to you?

Your answer

According to your definition, how could the Workshop improve its sustainability?

Your answer

Please indicate how strongly you agree or disagree with the following statements. (where 1 = Strongly disagree and 5 = Strongly agree)

The Worcester Arts Workshop should strive to promote environmental sustainability in all of its activities.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Comments:

Your answer

The Worcester Arts Workshop should seek substantial funding to make the building more environmentally sustainable.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Comments:

Your answer

Café Bliss should continue to promote environmental sustainability by using locally-grown, organic foods.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Comments:

Your answer

BACK NEXT 71% complete

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Here we will just be asking you a few general questions.

Please note any other suggestions you may have to help improve the Workshop.

Your answer

Would you be interested in helping promote classes and events?

- ○ Yes
- ○ No
- ○ Maybe

Would you be interested in volunteering for the Workshop in other ways?

- ○ Yes
- ○ No
- ○ Maybe

Gender:

- ○ Male
- ○ Female
- ○ Prefer not to say

Age:

- Under 21
- 21 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 or older

BACK NEXT 85% complete

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Prize Draw Information

If you wish to be entered into the prize draw, please indicate your name and preferred email address below. This information will be used only for the raffle; no personal identifying information will be used in our analysis or reports.

The winner will receive two event tickets!

If you do not wish to enter, please click the submit below.

Enter name here:

Your answer

Enter email here:

Your answer

Thank you for your participation!

BACK SUBMIT 100%: You made it.

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Appendix H - Reference Checklist from IQP

Basic Information	
Date of Energy Audit:	
Department/Building/Area covered:	
Persons conducting audit:	
Normal occupancy hours of building:	

Lighting	
Are any tungsten lights present? Look particularly in store rooms, up lighters, desk lamps etc. · replace with compact fluorescents · replace with LED · Not Practical to replace	
If there are several light switches, can they be labeled to make it more obvious which switches relate to which fixtures?	
Is daylight being used effectively? · Locate work stations adjacent to windows · Turn off lights when daylight is sufficient · Clean windows and skylights · Install light sensors and dimming equipment which	

compensates for natural lighting	
Lights on in intermittently occupied spaces(bathrooms, storerooms ..) - Install sensors - Install timer - Behavioral change	
Are any external lights on during daylight hours? - Install sensor - Put on timer - Behavioral change	
Are light levels too high or is there lighting from multiple sources? - Turn off main lights to make use of ambient lighting	
Is the light level to low/are bulbs dull? - Clean light fittings	
Have two lamps been removed from four-lamp fixtures where possible?	
Number of T-5 lights	
Number of T-8 lights	
Number of T-12 lights	
Number of Halogen lights	
Number of CFLs	

Heating	
What is the actual temperature in the space?	
Does the temperature vary much during the day? - Change the location of thermostats from areas subject to extreme temperature fluctuations, such as next to window, or over a heating or cooling unit.	
Do occupants complain it is too hot or too cold?	
If there are Thermostatic Radiator Valves (TRVs), are they set correctly? Do they actually work or are they broken?	
Are radiators effective and giving consistent heat? They may need bleeding of air or maintenance to remove dust and sediment.	
If the room tends to overheat, is there any bare pipework that could be insulated?	
Are radiators blocked, restricting air circulation?	
Are external doors and windows closed when heating is on? - Add automatically closing door - Behavioral change	
Are windows in good condition? Are any window panes	

cracked or broken? Are windows insulated? · Replace broken windows · Get double pane windows · Add removable addition to current windows	
Is Heating/cooling started before people arrive or operates during the last hour of occupancy? · Experiment with start times to get satisfactory comfort levels · Reduce or turn off heating or cooling during the last hour of use.	
If there is a roof space, is it insulated? · Before replacing water damaged insulation, repair roof where required. · Verify that vapor barrier faces the conditioned space and is intact. · Add new insulation to meet recommended standard. (check the cost effectivenessof this measure)	
Space temperatures are higher or lower than Thermostat settings. · Recalibrate thermostat. · Ensure that heat generating device is producing heat and that heat distribution to the space is unobstructed. · .Make sure that air intake volume is not excessive.	
Is heating on in unoccupied or little used spaces? · Reduce winter thermostat to 55º in unoccupied areas · Turn off heating if nothing in space can freeze · Use spot heaters in large spaces with low occupancy · Increase summer thermostat setting in unoccupied areas	
Have thermostat settings been adjusted for change in seasons? · Adjust thermostats to 68ºF in heating season and to 78ºF during cooling season.	
Are building temperatures adjusted for unoccupied periods? · Reduce thermostat settings by a minimum of 10°F at nights, for weekends and holidays during heating season, but maintain ventilation · Shut down air conditioning units at night, on weekends and holidays · Install automated system for above	
How many kW do the boilers use?	
How long is each boiler on per day?	

Cooling and Ventilation	
If there is air conditioning with local controls, make sure it is only on when necessary. Is it obvious how to control it? What temperature is it set to?	
Is air conditioning running at the same time as heating? · Check heating and cooling set points	
Are all external doors and windows closed when air conditioning is on? · Behavioral change · Automatically closing doors	
Is natural ventilation (e.g. windows and doors open with no air conditioning on) being used?	
Is air conditioning on in unused spaces, such as cupboards, corridors? · Turn off air conditioning in these spaces · Close or block vents	

Electrical Equipment	
Are computers, printers, photocopiers and other equipment switched off at the end of the day? - Set to turn off automatically - Behavioral change	
Can computers and other electrical equipment be programmed to 'power down' or 'energy save' mode?	
Can a 7 day timer be put on some equipment (e.g. photocopiers, water coolers, cold drinks machines) to regulate when systems are powered down?	
Can any equipment be switched on later and switched off earlier?	
Can kettles be removed if there is a wall mounted boiler?	
Are fridges places next to heat sources?	
Do evaporator coils have heavy ice build-up - Defrost coils regularly - Determine if the defrost system is improperly adjusted or defective - Determine if air is leaking into refrigerated area from defective door gaskets or poorly sealed wiring or piping	

penetrations.	
Is the fridge thermostat working and set to the right temperature (2-4 °C)?	
Is equipment clearly labeled so that staff knows how to activate energy saving features or switch it off?	

Water Use

Is there any evidence of water leaks? (e.g. wet pathways on a dry day)	
Are taps left running? Are there any dripping taps? Do taps need maintenance?	
Are hot water heater timers set correctly?	
How long does the hot water calorifier take to heat up?	
How long is the hot water calorifier on for per day?	
Is a surrey council water audit recommended?	

Awareness and Building Usage

Are there posters/guidance displayed to remind people of good practice?	
When is the building primarily used and what is it used for?	

Made with reference to the State University Cooperative Extension Energy Program Energy Auditor Checklist

Appendix I - Reference Checklist from Energy Website

Section 1 Walkaround checklist

Community building and address:
Community group:
What fuel do you use for your space heating:
What fuel do you use for your water heating:
What fuel do you use for your lighting:
What fuel do you use for your electrical appliances:
Date of survey:
Survey completed by:
Weather (e.g. dry/wet, cold/mild/warm, windy/still, sunny/overcast)

NB Further information on the points in this checklist can be found in Section 3.

A) Insulation and draughtproofing	Comments
Are there any cold draughts from windows or doors?	
Are windows double glazed?	
Does the building have a flat roof or a pitched roof?	
Is the roof properly insulated? (The recommended depth for mineral wool insulation is 27cm)	
Does the building have solid walls or cavity walls? (The pattern of the brickwork will give you an idea)	
Are the walls insulated?	
Are there draughts from the floor? Could the flooring material be improved?	
B) Space and water heating	**Comments**
Is the temperature comfortable?	
Have there been complaints from building users?	

Is the heating working?	
Are portable heaters being used?	
Is the heating on, but windows/doors open?	
Are there timers? If so, do they work, and are they set for the right times?	
Are thermostats for the heating working and set to the right temperature (19-20°C)?	
Are there any obstructions in front of the radiators or heaters?	
Do the radiators have thermostatic radiator valves? Are they used effectively?	
Is all associated pipework insulated?	
Is heating and air conditioning on at the same time in the same area?	
Is heating or air conditioning on in unused spaces, such as cupboards and corridors?	
Have there been complaints that the building is too hot or cold?	
Are people in the building dressed appropriately for the time of year?	
Are blinds or curtains closed at the end of the day during winter to cut down on heat loss?	
Is air conditioning on, but windows/doors open?	
Is air conditioning turned off at the end of the day (as early as possible)?	
Are air conditioning thermostats working and set to the right temperature (23-25°C)?	
Are blinds closed during summer to help avoid over-heating?	

C) Lighting	Comments
Are lights on in empty rooms/unoccupied areas? (if so, where?)	
Are lights on when daylight is sufficient?	
Are the windows clean?	
Are light fittings clean?	
Are light switches clearly labelled?	
Is external lighting switched off during the day?	
Are low-energy (CFL) light bulbs being used?	
Are lights located in appropriate places?	
D) Appliances	Comments
Are computers left on overnight or at weekends?	
Are monitors switched off when not in use and screensavers disabled?	
Are photocopiers or printers left on overnight or at weekends?	
Are photocopiers in a well ventilated area – not where there is air conditioning?	
Are powersave facilities of equipment (e.g. fax machines, printers, photocopiers) activated during the day?	
Do users print/copy double-sided?	
Is a tray of used paper available for printing on the other side?	
Is equipment clearly labelled so that users know how to activate energy-saving features or switch it off?	
Are vending machines and water coolers left on all the time?	

Is the water cooler thermostat working and set to the right temperature (12-15°C)?	
Is the fridge/freezer defrosted regularly?	
Is the fridge/freezer door left open longer than necessary?	
Is the fridge thermostat working and set to the right temperature (2-4 °C)?	
What other electrical appliances (e.g. TV, radio, projector, kettle) are regularly used? Could they be used more efficiently?	
E) Water use	Comments
Is the water at the right temperature – not any hotter than it needs to be (60 °C)?	
Are there any signs of leaks, or dripping taps?	
Is associated pipework insulated?	
Are taps left running after use?	
Are flushes on toilets and urinals working properly?	

Appendix J - Boiler Checklist

Boiler			
Type			
energy usage rating			
how long it runs per day			
does it cycle on/off			
fuel type			

Appendix K - Water Heater Checklist

Water Heating Tank			
Type			
energy usage rating			
how long it runs per day			
does it cycle on/off			
fuel type			

Appendix L - Kiln Checklist

Kiln			
Type			
energy usage per firing cycle			
how many cycle per week			
fuel type			
could waste heat be used for other uses			
Is there a set scheudle for tutors to follow			

Appendix M - Jim Lott Interview Advice

Big easily visual issues:

- Single glaze windows
- Doors are very drafty
- Solid brick walls on main building have no insulation
- Need to insulate pipes for heaters in rooms

Things to consider:

- Energy use vs comfort of people
- Rooms that are not heated vs rooms that are not heatable
- Want heated walls not heated air
- Satisfaction with boiler to see if replacing it is necessary
- People know more about the building by just sitting there
- Why are some of the lights missing?
- Are things left on

Actual things to get done

- Look into getting electrical radiant heaters (wall panel heaters)
- Need insulation in basement room to heat properly
- Do heat loss calculation for rooms and building
- Easiest fixes will be seals and draft proofs for windows and doors
- Find out when vamos was built
- Look into insulation for inside of building
- Do lighting audit and check for type/ frequency

Appendix N - Jim Lott Recommendation List

Ideas for making building more efficient and sustainable:		
solar panels		
New boiler		
Replace windows		
Draught proof windows		
Replace doors		
Insulate all interior walls		
Insulate ceiling in loft		
Change all the lighting		
Knock down the building	Practical	
Install those wall heater thingys	Possibility down the road	
Install heated flooring	Not practical	
Replace water heater	Unnessesary	
Buy a combined water heater/boiler		
Have separate rubbish and recycling bins		
Replace toilets		
Buy new computers that are more energy efficient		
Insulate pipes		
Replace thermostats		
Get draught slips for doors		
Switch energy provider		
Buy new fridge for cafe		
Move fridge		
Instal motion sensor for lights		

Appendix N1 - Solar Panels

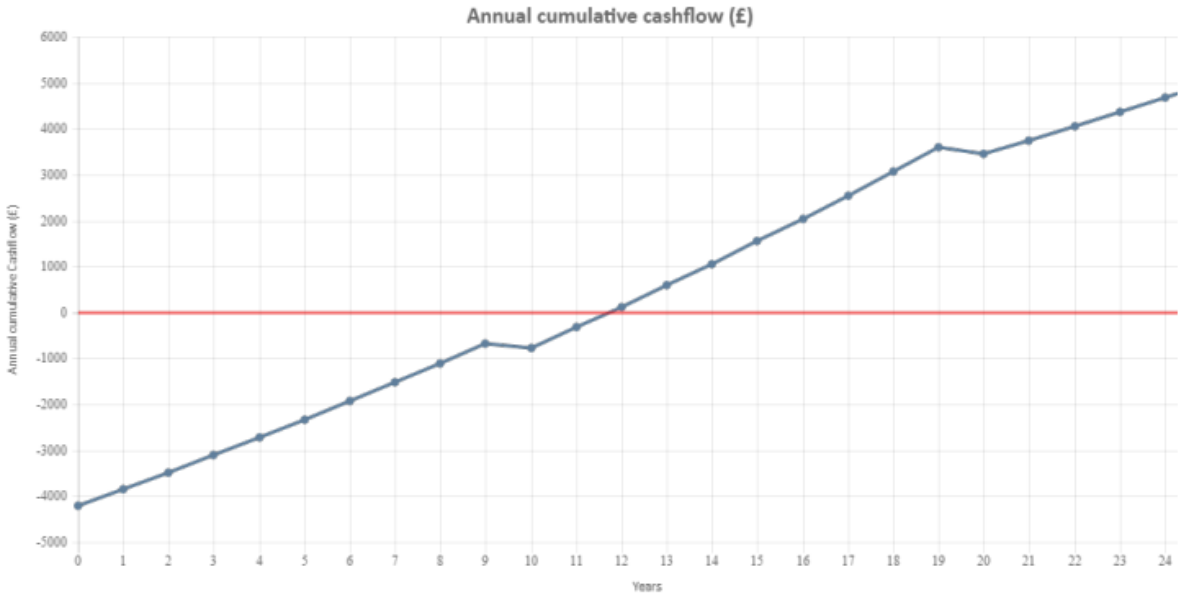
Results given by Encraft Solar Panel Calculator website:

RESULTS

POSTCODE:	WR11UH
ROOF ORIENTATION:	94^0 from South
ROOF TILT:	50^0
SHADING FACTOR:	0.80
NUMBER OF PANELS:	14
SYSTEM CAPACITY:	3.50kW
SYSTEM OUTPUT:	1904kWh/year
TOTAL SAVINGS:	£5,002

FIT GENERATION INCOME OVER 20 YEARS	£2,637
INCOMES FROM THE ELECTRICITY EXPORTED	£1,607
INCOMES FROM THE ENERGY SAVINGS	£6,154

TOTAL COST OF THE INSTALLATION PAID IN YEAR 1	£4,200
ACCRUED COST TO ALLOW FOR REPLACEMENT OF INVERTER, MAINTENACE AND INSURANCE	£1,196



Year	Output of the System (kWh)	FIT Payment	Export tariff Payment	Energy Bill Savings	Expenditures	Cashflow	Cumulative Cashflow
0	0	£0	£0	£0	£4,200	£-4,200	£-4,200
1	1904	£114	£63	£181	£0	£358	£-3,842
2	1885	£116	£65	£185	£0	£366	£-3,475
3	1866	£118	£66	£190	£0	£374	£-3,101
4	1847	£119	£68	£195	£0	£382	£-2,719
5	1829	£121	£70	£199	£0	£390	£-2,329
6	1811	£123	£71	£204	£0	£399	£-1,930
7	1793	£125	£73	£209	£0	£407	£-1,523
8	1775	£127	£75	£215	£0	£416	£-1,107
9	1757	£129	£77	£220	£0	£425	£-682
10	1739	£130	£79	£225	£525	£-90	£-772
11	1722	£132	£81	£231	£0	£444	£-328
12	1705	£134	£83	£237	£0	£453	£125
13	1688	£136	£85	£242	£0	£463	£589
14	1671	£138	£87	£248	£0	£473	£1,062
15	1654	£140	£89	£254	£0	£484	£1,546
16	1638	£142	£91	£261	£0	£494	£2,040
17	1621	£144	£93	£267	£0	£505	£2,545
18	1605	£147	£96	£274	£0	£516	£3,061
19	1589	£149	£98	£281	£0	£527	£3,588
20	1573	£151	£100	£287	£671	£-133	£3,455
21	1557	£0	£0	£295	£0	£295	£3,750
22	1542	£0	£0	£302	£0	£302	£4,051
23	1526	£0	£0	£309	£0	£309	£4,361
24	1511	£0	£0	£317	£0	£317	£4,678
25	1496	£0	£0	£325	£0	£325	£5,002

Appendix N2 - Windows

Replacing Windows				
Store	Price per 625x1195	Material		
Homebase	160	PVC		
B&Q	267	timber	Window count	Cost to replace all
wicks	320	timber	34	9078

Draught proofing options		
Type	cost	notes
Stormguard Rubber Self Adhesive Weather Strip, (L)10m	7 quid for 10 meter	not the most pleasant looking but would be the easiest to instal without help. can probably paint over to match color
Stormguard EPDM Rubber Self Adhesive EPDM Rubber P Strip, (L)20m	11 quid for 7 meters	will be super obvious but might have better seals, less easy to paint over

Appendix N3 - Doors

doors that need it
7
can use the stuff that was for the windows as well as the bottom bars
need to see space below doors and make reccomendation based on door size

Store	Type	cost	Material	gap size	Total cost
B&Q	Stormguard Aluminium/ Brush Door Seal, (L)2134mm	13	aluminum/ brush	25mm	91
B&Q	B&Q PVC/ Brush Door Seal, (L)838mm	5	pvc/brush	25mm	35
homebase	Stormguard Brush Bottom PVC Door Strip - Brown	7.49	pvc/brush	15mm	52.43
homebase	Stormguard Brush Bottom Door Strip - White	8.49	wood/brush	15mm	59.43

Appendix N4 - Insulation

room	needed
pottery room	yes
balcony studio	no
cafe	no
office	no
studio 1	no
	about 10 meters

Pipes:

Unbranded	Unbranded	
Colour	Grey	Grey
Fire Rating	Class P Fire Rating	Class P Fire Rating
Manufacturer Guarantee	1 years	1 years
Manufacturing Standards	BS 476 Part 12 & Exceeds BS 7523:1991 Type A	BS 476 Part 12 & Exceeds BS 7523:1991 Type A
Product Diameter	22 mm	28 mm
Product Length	1 m	1 m
Product Thickness	13 mm	13 mm
Product Type	Economy Pipe Insulation	Pipe Insulation
Specifications	Pre-cut 1m lengths. BS 476.	Pre-cut 1m lengths. BS 476.
Price	0.89	1.04
total	8.9	10.4

Loft:

5127	Area (mm^2)	m^2
7500	38452500	38.4525

Type	Unit Price (pound)	Material	Coverage m^2	# needed	Cost	R-value	Link
B&Q Homeeco Loft Insulation, (L)3m (W)370mm (T)200mm	18	polyester & wool	1.11	34.64189189	623.5540541	4.55 m^2K/W	http://www.diy.com/depar
Knauf Space Blanket, (L)4m (W)1.14m (T)200mm	34	glass mineral wool	4.56	8.432565789	286.7072368	4.5 m^2K/W	http://www.diy.com/depar
Knauf Ekoroll Loft Insulation, (L)4830mm (W)1140mm (T)200mm	25	glass mineral wool	5.5	6.991363636	174.7840909	4.5 m^2K/W	http://www.diy.com/depar
KNAUF 200MM SUPER TOP UP LOFT ROLL INSULATION 5.61M2	22	glass mineral wool	5.61	6.854278075	116.5227273	4.5	http://www.wickes.co.uk/I
	17	for 4 or more			0		
KNAUF 200MM SPACE ENCAPSULATED BLANKET - LOFT ROLL INSULATION 4.10M2	34	encapsulates glass mineral wool	4.1	9.378658537	318.8743902	4.5	http://www.wickes.co.uk/I

https://adax-solaire.com/presta/gb/247-adax-neo-electric-panel-heaters-convectors-wall-mounted-neo-np

Can get 2000W to 400W

2000W: $226.00-179.00

1400W: $209.00-162.00

1200W: $198.00-151.00

1000W: $191.00-143.00

800W: $183.00 - 136.00

600W: $179.00 -132.00

400W $174.00 - 127.00

Size of theater: 9048 X 13477 =

http://cadetheat.com/blog/right-wattage-heater/

Don’t need that much power, but would want to maximize heated surface area:

Would recommend either 3 400W or 2 600W

3 400W = $428

2 600W = $311

Appendix N5 - Motion Sensors

15 pounds

http://www.screwfix.com/p/lap-360-ceiling-standalone-surface-mounted-pir/80538

Brand	LAP
Colour	White
Construction Material (Lighting)	Polycarbonate

Fixings Supplied	Fixings supplied
IP Rating	IP44
Manufacturer Guarantee	1 years
Model No	IQ-SA-360-CS-W
Pack Size	1
Pieces in Pack/Case	1
PIR	PIR
Power Voltage Supply	230 V

Product Depth	55 mm
Product Height	55 mm
Product Type	360° Ceiling Standalone Surface-Mounted PIR
Product Width	55 mm
Total Product Weight	0.201 kg

230V. 50Hz. IP44. Switching capacity: 1000W incandescent and 300W fluorescent. Fixings supplie

Appendix O - Lighting Inventory Spreadsheet

	Type of Fixtures	# of Fixtures	Bulbs per fixture	Type of Bulbs		# of Bulbs	# of Ghost Bulbs	Wattage	Hours per day	KWh per day	KWh per month	Pounds per month	Total KWh per month	Total Lighting Bill per month			
Studio 1	Spotlight	5	1	Incandescent		3	2	60	4	0.24	21.6	3.124656	416.055	60.1865163			
				CFL		1		15	4	0.06	1.8	0.260388					
				Incandescent Spotl	60W	1		60	4	0.24	7.2	1.041552					
	Straight	3	2	Fluorescent		4	2	32	4	0.128	15.36	2.2219776					
Studio 2	Straight	8	1	Fluorescent	T8	6	2	32	4	0.128	23.04	3.3329664					
	spotlight	1	1	incan		1	0	60	4	0.24	7.2	1.041552					
Pottery	straight	7	1	Fluorescent	T8	7	0	32	3	0.096	20.16	2.9163456		Electricty Monthly Average		Percentage light per month average	
Cafe	straight with cover	6	2	fluor	f36W/35	10	2	36	5	0.18	54	7.81164		340.37091		17.68%	
	Hanging track lights	3	5	halogen? research		7	8	38	5	0.19	39.9	5.771934					
	Mounted track lights	1	4	CFL	16A 250V N	0	2	Never on									
				Incandescent		0	2										
	Mounted track lights	2	1	CFL		0	2										
	circular	1	1	Incandescent		1	0	16	5	0.08	2.4	0.347184					
Theatre	Square CFL	8	1	CFL	circular	8	0	20	1	0.02	4.8	0.694368					
	Spotlight	30	1	CFL		10	19	11	1	0.011	3.3	0.477378					
				Incandescents		1		11	1	0.011	0.33	0.0477378					
	grid lights	8	1	CFL		4	1	15	4	0.06	7.2	1.041552					
				Incan		3	0	60	4	0.24	21.6	3.124656					
	Theatre Spotlights	6	1	LED		6	0	150	1	0.15	27	3.90582					
Cellar	Square CFL	3	1	CFL	circular	2	1	20	3.5	0.07	4.2	0.607572					
	spotlight	9	1	Incan		3	0	11	3.5	0.0385	3.465	0.5012469					
				small halogen		2		40	3.5	0.14	8.4	1.215144					
				asda bulb		1		42	3.5	0.147	4.41	0.6379506					
Sarah Office	Spotlight	4	1	Incandescant		2	2	60	5	0.3	18	2.60388					
	Straight	4	2	Fluorescent	F36W/35	5	3	36	5	0.18	27	3.90582					
Vamos Office	straight	6	2	T8	F36W/35	9	3	36	5	0.18	48.6	7.030476					
		1	1	t8	F36W/35	1	0	36	5	0.18	5.4	0.781164					
	spotlight	1	1	cfl	14W, 220-240	1	0	15	5	0.075	2.25	0.325485					
Hallways	Yellow wrapped bulb	2	3	?		2	4	40	5	0.2	12	1.73592					
	double T5	4	2	flour T5		5	3	8	5	0.04	6	0.86796					
	single T5	4	1	fluor T5	F8W/33	4	0	8	5	0.04	4.8	0.694368					
	spotlight	2	1	halogen? LED?		2	0	5	5	0.025	1.5	0.21699					
	circular	2	1	Incandescent		0	2	16	5	0.08	0	0					
	single straight with c	3	1	flour		1	2	30	5	0.15	4.5	0.65097					
Bathrooms	straight	4	1	fluor T8	F36W/35	4	0	36	2	0.072	8.64	1.2498624					
Outside	spotlight	1	2	halogen		2	0	40	0	0	0	0					

Appendix O1 - LED Lighting Calculations

	Type of Fixtures	# of Fixtures	Bulbs per fixture	Type of Bulbs		# of Bulbs	# of Ghost Bulbs	Wattage	Hours per day	KWh per day	KWh per month	Pounds per month	Total KWh per month	Total Lighting Bill per month	Cost to replace spotlights (32 leds)	Cost to replace straight tubes (46 bulbs)
Studio 1	Spotlight	5	1	Incandescent		3	2	5.6	4	0.0224	2.016	0.29163456	235.722	34.09954452	57.28	513.82
				CFL		1		5.6	4	0.0224	0.672	0.09721152				
				Incandescent Spotlight	60W	1		5.6	4	0.0224	0.672	0.09721152				
	Straight	3	2	Fluorescent		4	2	19	4	0.076	9.12	1.3192992				
Studio 2	Straight	8	1	Fluorescent	T8	6	2	19	4	0.076	13.68	1.9789488				
	spotlight	1	1	incan		1	0	5.6	4	0.0224	0.672	0.09721152				78
Pottery	straight	7	1	Fluorescent	T8	7	0	19	3	0.057	11.97	1.7315802				
Cafe	straight with cover	6	2	fluor	f36W/35	10	2	19	5	0.095	28.5	4.12281				
	Hanging track lights	3	5	halogen? research		7	8	38	5	0.19	39.9	5.771934				
	Mounted track lights	1	4	CFL		0	2									
				Incandescent	16A 250V Nokia XTKR31	0	2	Never on								
	Mounted track lights	2	1	CFL		0	2									
	circular	1	1	Incandescent		1	0	16	5	0.08	2.4	0.347184				
Theatre	Square CFL	8	1	CFL	circular	8	0	20	1	0.02	4.8	0.694368				
	Spotlight	30	1	CFL		10	19	5.6	1	0.0056	1.68	0.2430288				
				Incandescents		1		5.6	1	0.0056	0.168	0.02430288				
	grid lights	8	1	CFL		4	1	5.6	4	0.0224	2.688	0.38884608				
				Incan		3	0	5.6	4	0.0224	2.016	0.29163456				
	Theatre Spotlights	6	1	LED		6	0	150	1	0.15	27	3.90582				
Cellar	Square CFL	3	1	CFL	circular	2	1	20	3.5	0.07	4.2	0.607572				
	spotlight	9	1	Incan		3	0	5.6	3.5	0.0196	1.764	0.25518024				
				small halogen		2		5.6	3.5	0.0196	1.176	0.17012016				
				asda bulb		1		5.6	3.5	0.0196	0.588	0.08506008				
Sarah Office	Spotlight	4	1	Incandescant		2	2	5.6	5	0.028	1.68	0.2430288				
	Straight	4	2	Fluorescent	F36W/35	5	3	19	5	0.095	14.25	2.061405				
Vamos Offic	straight	6	2	T8	F36W/35	9	3	19	5	0.095	25.65	3.710529				
		1	1	t8	F36W/35	1	0	19	5	0.095	2.85	0.412281				
	spotlight	1	1	cfl	14W, 220-240V	1	0	15	5	0.075	2.25	0.325485				
Hallways	Yellow wrapped bulb	2	3	?		2	4	40	5	0.2	12	1.73592				
	double T5	4	2	flour T5		5	3	8	5	0.04	6	0.86796				
	single T5	4	1	fluor T5	F8W/33	4	0	8	5	0.04	4.8	0.694368				
	spotlight	2	1	halogen? LED?		2	0	5	5	0.025	1.5	0.21699				
	circular	2	1	Incandescent		0	2	16	5	0.08	0	0				
	single straight with cover	3	1	flour		1	2	30	5	0.15	4.5	0.65097				
Bathrooms	straight	4	1	fluor T8	F36W/35	4	0	19	2	0.038	4.56	0.6596496				
Outside	spotlight	1	2	halogen		2	0	40	0	0	0	0				
			44			119	62									
https://www.ledhut.co.uk/7-watt-e27-high-output-standard-shape-led-bulb.html?gclid=CJW94qC1icwCFagy0wodWTcNLA#994=582																
^LED bulb link							41	181	0.34254143							
http://uk.rs-online.com/web/p/led-tube-lights/8772081/																
^Straight tube bulb link						78										
						65.55%										

Appendix P - Café Bliss Audit Spreadsheet

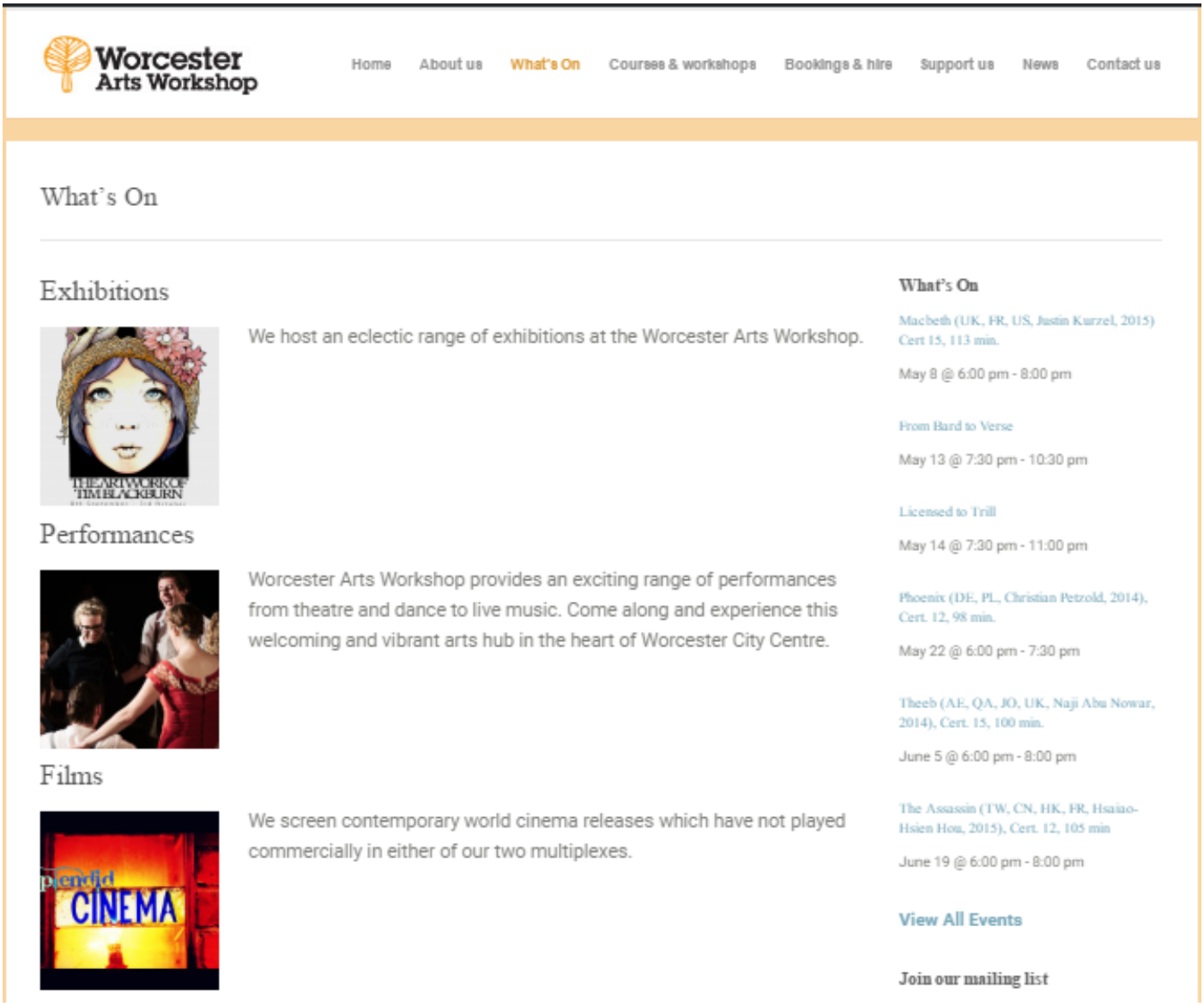
Appliance	# of applinces	Wattage	Hours per day	KWh per month	Cost per month	Notes	
Stove		5000	3	450	19.935	falcon	GAS
Microwave	2	1850	0.5	27.75	8.02863	samsung cm1919	
Dishwasher	1	6900	0.1	20.7	2.994462	once a week	clenaware
Fan	1		3	0	0	bg lowland	
Kettle	1	1600	1.5	72	10.41552		
Fridge	1	521	12	187.56	27.1324296	beko a class	
Freezer	1	700	12	252	36.45432		
fridge	2	204 kw/year	1	17	4.91844	frost freeze a rated	
beer fridge	1	130	12	46.8	6.770088		
frier	1	8000	1	240	34.7184	buffalo brand	
esspreso machine	1	3800	0.25	28.5	4.12281	feimma	
coffee machine	1	2000	1	60	8.6796	brabilor bonamat	mondo 2
					144.2346996		

Appendix Q - Survey Coding Chart

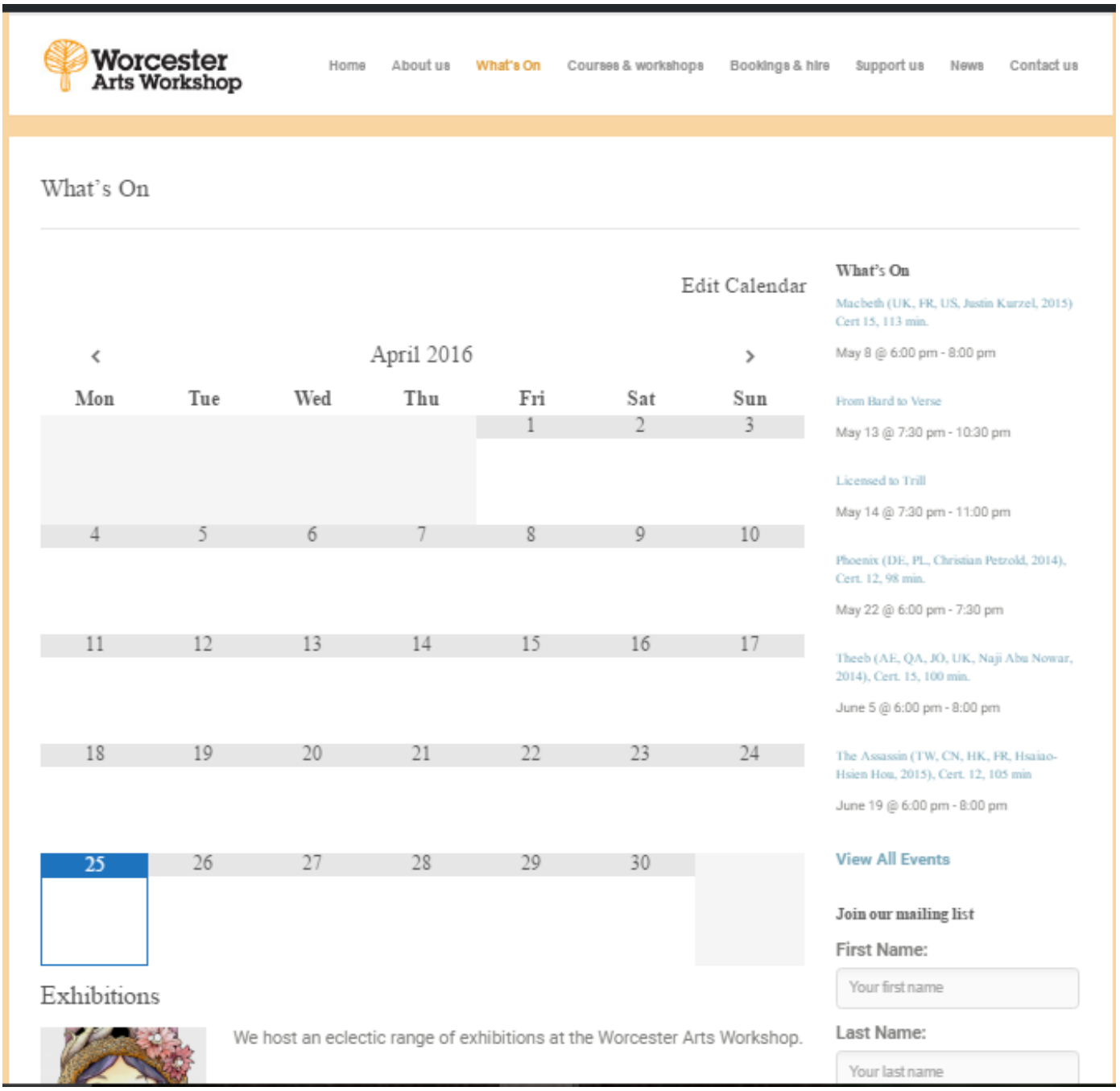
Question	Answers	
What is the reason you are currently not enrolled in any classes?	Uninterested	7
	Time	12
	Distance	4
	Cost	3
	Cost & Convenience	5
	Unaware	2
	Other	2
How would you suggest the Workshop might improve the experience for participants in the future?	Cleaner space	2
	Variety	2
	Evening Classes	3
	More Organized	5
	Lower Prices	1
	Unsure	1
What is the reason you have not attended any events?	Not Advertised	3
	Busy	4
	Not Interested	3
	Unaware	2
	Distance	1
How would you suggest the Workshop might improve the experience for participants in the future?	Better signage	1
	Organized space	2
	More Parking	2
	Cheaper	1
	No Complaints	1
What does sustainability mean to you?	Eco-friendly	5
	Future	9
	Resourceful	8
	Financial Benefits	3
	Self-sufficiency	9
	Needs Met	1
According to your definition, how could the Workshop improve its sustainability	Community Mutualism	6
	Advertisement	5
	Atmosphere	2
	Energy Efficient	5
	Other	6
Please note any other suggestions you may have to improve the Workshop?	Cleaner Supplies	2
	Advertisement	3
	Outside Décor	3
	Updated Info Board	2
	Other	5

Appendix R - Website Before and After

Old Website:



New Website:


Worcester Arts Workshop
Home
About us
What's On
Courses & workshops
Bookings & hire
Support us
News
Contact us
What's On
Edit Calendar
April 2016
Mon
Tue
Wed
Thu
Fri
Sat
Sun
What's On
Macbeth (UK, FR, US, Justin Kurzel, 2015) Cert 15, 113 min.
May 8 @ 6:00 pm - 8:00 pm
From Bard to Verse
May 13 @ 7:30 pm - 10:30 pm
Licensed to Trill
May 14 @ 7:30 pm - 11:00 pm
Phoenix (DE, PL, Christian Petzold, 2014), Cert. 12, 98 min.
May 22 @ 6:00 pm - 7:30 pm
Theeb (AE, QA, JO, UK, Naji Abu Nowar, 2014), Cert. 15, 100 min.
June 5 @ 6:00 pm - 8:00 pm
The Assassin (TW, CN, HK, FR, Hsiao-Hsien Hou, 2015), Cert. 12, 105 min
June 19 @ 6:00 pm - 8:00 pm
View All Events
Join our mailing list
First Name:
Your first name
Last Name:
Your last name
Exhibitions
We host an eclectic range of exhibitions at the Worcester Arts Workshop.

Appendix R1 - Google Calendar Instructions

- Calendars are not yet published to website
    - To publish to go the calendar page and click publish

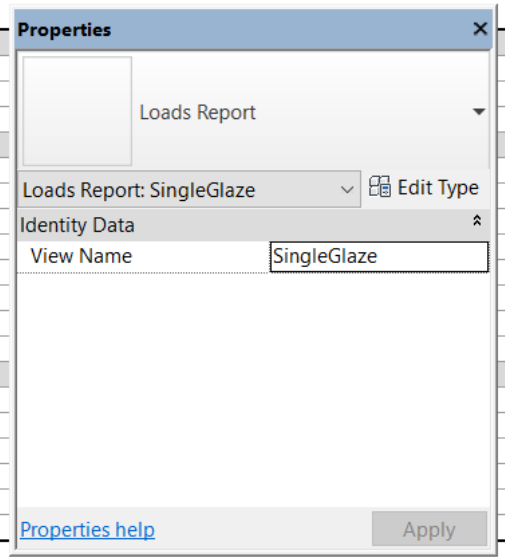
- To Update calendar:
    - Update events under “Events Calendar for Website”
    - Update classed under “Classes for Website”
    - Café Bliss also has the ability to put their calendar on their page

- How to put a calendar on the page:
    - Click drop down from specific calendar
        - Make sure calendar is publicly viewable
    - Go to that calendar’s settings
        - Find “Calendar ID” under Calendar Address
        - Copy that link
    - Go to “Calendar - add new” on WordPress
    - Go to section “calendar settings”
        - Click on google calendar
        - Paste link here
        - Save
        - Copy the calendar short code
    - Go to page where you want to put calendar
        - Paste the short code
        - save

Appendix S - Building Summary Calculations

Building Summary

Inputs	
Building Type	Office
Area (m²)	423
Volume (m³)	1,169.84
Calculated Results	
Peak Cooling Total Load (W)	**38,141**
Peak Cooling Month and Hour	August 3:00 PM
Peak Cooling Sensible Load (W)	37,316
Peak Cooling Latent Load (W)	825
Maximum Cooling Capacity (W)	38,141
Peak Cooling Airflow (L/s)	2,837.8
Peak Heating Load (W)	**37,158**
Peak Heating Airflow (L/s)	1,974.5
Checksums	
Cooling Load Density (W/m²)	90.15
Cooling Flow Density (L/(s·m²))	6.71
Cooling Flow / Load (L/(s·kW))	74.40
Cooling Area / Load (m²/kW)	11.09
Heating Load Density (W/m²)	87.83
Heating Flow Density (L/(s·m²))	4.67



Building Summary

Inputs	
Building Type	Office
Area (m²)	423
Volume (m³)	1,169.84
Calculated Results	
Peak Cooling Total Load (W)	**33,836**
Peak Cooling Month and Hour	July 4:00 PM
Peak Cooling Sensible Load (W)	33,011
Peak Cooling Latent Load (W)	825
Maximum Cooling Capacity (W)	33,836
Peak Cooling Airflow (L/s)	2,515.1
Peak Heating Load (W)	**34,729**
Peak Heating Airflow (L/s)	1,845.5
Checksums	
Cooling Load Density (W/m²)	79.97
Cooling Flow Density (L/(s·m²))	5.94
Cooling Flow / Load (L/(s·kW))	74.33
Cooling Area / Load (m²/kW)	12.50
Heating Load Density (W/m²)	82.09
Heating Flow Density (L/(s·m²))	4.36